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THE IDENTITY OF *SESBANIA PACHYCARPA* DC., AND A NEW SUBSPECIES FROM S. W. AFRICA

by

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THE original description of *Sesbania pachycarpa* by DE CANDOLLE is brief and inadequate and the two syntypes at Geneva have apparently not been studied by subsequent workers on the genus. Under these circumstances the name has been applied to two perfectly distinct species: GUILLEMIN & PERROTTET (1832) and CRONQUIST (1954) using it for species A, which has been much confused with *S. bispinosa* (Jacq.) Wight (*S. aculeatea* Pers.), but whose correct name, if *S. pachycarpa* does not apply, would be *S. sinuo-carinata* Ali; while BERHAUT (1953) and HEPPER (1958) use it for species B, whose correct name would otherwise be *S. rostrata* Bremekamp & Obermeyer. BAKER (1871) applies the name to a mixture of species B and one or two other species, PHILLIPS & HUTCHINSON (1920) to a mixture of species A and B and at least two further species, and HUTCHINSON & DALZIEL (1928) to a mixture of A and B. From our present rather full knowledge of the flora of Senegal, whence *pachycarpa* was described, it is clear that the name *must* apply either to species A or to species B.

In order to clear this matter up, as it is impossible to borrow specimens from the DE CANDOLLE herbarium in Geneva, the differences between species A and B were tabulated and sent to Geneva, together with specimens of each and a request for co-operation in discovering to which species the types of *S. pachycarpa* belonged. Dr. R. WEIBEL of the Geneva Herbarium most kindly replied very fully to this questionnaire and also sent us photographs of DE CANDOLLE's syntypes, *Sparrmann* s. n. and *Perrottet* (1825) 114.

The table of differences between species A and B (slightly emended) is given as table 1 below, and in table 2 Dr. WEIBEL's replies and information gained from the photographs, eva-

TABLE 1

Character	species A *(S. sinuo-carinata)*	species B *(S. rostrata)*
Indumentum of stem	absent (except when very young)	sparse or dense
» » leaf rhachis	» » » » »	» » »
» » midrib of leaflets	» » » » »	» » »
» » pedicels	absent	present
» » calyx	absent except for margin	often present
Glandular outgrowths on stems	absent	usually present in vertical rows above leaf axils on mature stems; usually represented in young stems by a row of dots
Prickles	usually present on lower half of leaf-rhachis, sometimes also on stems	absent
Inflorescence	usually appearing pseudo-corymbose, with a short axis and the lower pedicels much longer than the upper	usually clearly a raceme
Calyx teeth	with broadly acuminate tips	with more narrowly acuminate, sometimes almost filiform tips
Appendages at base of vexillum	without free tips	with short free tips
Blade of keel	wider than long, the tooth at its base at right angles to the claw	longer than wide, the tooth at its base more or less parallel to the claw
Style	pubescent in its distal half	glabrous
Septa of pod	6-7 (rarely 5) mm. apart	4-5 (rarely 5.5) mm. apart
Tip of pod	a short point	a long slender beak

TABLE 2

Character	*Sparrmann* s. n.	evaluation	*Perrottet* 114	evaluation
Indumentum of stem	absent	SS	few short hairs	RR
» » leaf rhachis	absent	SS	short stiff, ± dispersed, hairs	RR
Indumentum of leaflet midribs	absent	SS	few short stiff appressed hairs	RR
Indumentum of pedicels	absent	SS	stiff dispersed hairs	RR
Indumentum of calyx	absent	SS	nearly glabrous, stiff dispersed hairs	RR
Glandular outgrowths	absent	S	in young stems some brown dots	R
Prickles	absent	?R	absent	R
Inflorescence	in a bad state, seem to be pseudocorymbose	?R	pseudocorymbose	R
Calyx teeth	narrow acuminate	R	narrow acuminate	R
Appendages on vexillum	in poor condition	—	in poor condition	—
Blade of keel	in poor condition	—	in poor condition	—
Style	rare hairs on the tip	SS	glabrous	RR
Septa of pod	6 mm. apart	SS	4-5.5 mm. apart	RR
Tip of pod	a short point	SS	a long slender beak	RR

luated on a scale RR-SS, where RR means a decidedly 'rostrata' character, R a somewhat 'rostrata' character, — indifference and S and SS somewhat and decidedly 'sinuo-carinata' characters, are given for each of De Candolle's syntypes.

Thus the results of Dr. Weibel's kind cooperation, together with an examination of the photographs, which bring out clearly the last two points in table 2, leaves no doubt that the *Sparrmann* specimen is species A *(sinuo-carinata)*, while

the *Perrottet* specimen is species B (*rostrata*). Therefore the confusion goes right back to the inception of *S. pachycarpa*, which is based on material of both species.

Since the type method provides no simple answer to our problem it is necessary to study De Candolle's inadequate description minutely in order to discover whether it applies better to one species or to the other. His description of the plant as '*glabra*' is clearly correct for the *Sparrmann* specimen and *S. sinuo-carinata* and cannot apply to *S. rostrata*, which is never glabrous. His description of the racemes as '*subcorymbosis*', while tending somewhat in the other direction, is not inapplicable to certain forms or states of *sinuo-carinata*, as is his failure to mention prickles. It seems therefore clear that *pachycarpa* DC. is the correct name for *S. sinuo-carinata* Ali, leaving the other taxon as *S. rostrata*. Since the name has been so much used in the other sense or for mixtures of species, and since De Candolle's syntypes include two species, it is desirable that the full citation, *S. pachycarpa* DC. emend. G. & P., should be used, which warns the reader that the name has been applied in another fashion and guides him to a full description and a splendid plate, in which even such points as the indumentum of the style, ignored by all subsequent authors until Dr. Ali's excellent description of *S. sinuo-carinata* in 1958, are set forth.

My colleague Mr. F. N. Hepper has kindly studied the draft of the present paper and the material on which it is based, and now agrees with the interpretation of *S. pachycarpa* and the choice of lectotype here suggested.

In the following account of the nomenclature and distribution of *S. rostrata* and *S. pachycarpa* all specimens cited have been seen, unless otherwise stated. Statements in the description which are enclosed in square brackets are based on other specimens than the type.

1. **S. rostrata** *Bremekamp & Obermeyer* in Ann. Transvaal Mus. 16: 419 (1935).

   S. pachycarpa DC., Prod. 2: 265 (1825) p. p.; Bak. in Oliv. Fl. Trop. Afr. 2: 134 (1871) pro maj. parte; Phillips & Hutch. in Bothalia 1: 50 (1921) p. p.;

Hutch & Dalz., Fl. W. Trop. Afr. 1: 387 (1928) pro min. parte; sensu Berhaut in Bull. Soc. Bot. Fr. 99: 297-301 (1953) et Hepper in Hutch. & Dalz., Fl. W. Trop. Afr. 2nd edn. 1: 532 (1958), non ut emend. Guill. & Perr., Tent. Fl. Seneg. 200. t. 50 (1832), nec sensu Cronquist in Flore Congo Belge 5: 81 (1954).

[*S. pubescens* sensu Hutch. & Dalz., Fl. W. Trop. Afr. 1: 387 (1928) pro min. parte, non DC.].

[*S. aculeata* sensu Hutch. & Dalz. l. c. pro min. parte, non Pers.].

[*S. aegyptiaca* sensu Hutch. & Dalz. pro min. parte l. c., non (Poir.) Pers.].

S. hirticalyx Cronquist in Bull. J. Bot. Et. Brux. 22: 228 (1952) and Fl. Congo Belge 5: 82 (1954).

Mauritania: *Chudeaud* s. n. (P).

Senegal: *Berhaut* 1183, 1942, 2489, 3375, 3526, 3620, 3744, 3761, 3938 (all P); *Heudelot* 252 (K ex herb. Benth., P); *Perrottet* 229 (BM), 230 (BM), s. n. (G, excluded syntype of *S. pachycarpa* K, photo); *Roger* 23 ex herb. Gay (K); *Trochain* 945 (P), 4915 (P).

Mali (Soudan): *De Wailly* 4851 bis (P); *Hagerup* 404 (BM).

Niger republic: *Monod* 591 (P).

N. Nigeria: *Oudney, Denham & Clapperton* s. n. (BM); *Talbot* 242 (BM); *Lamb* 107 (K); *Parsons* s. n. (K); *Johnston* N 64 (K), N 96 (K).

Chad Republic: *Chevalier* 10286 (K, P), 10379 bis (P); *Creach* 112 (P).

Ubangi-Shari: *Chevalier* 7796 bis, 8965, 9796 (all P).

Congo: Katanga, Mabwe near Lake Upemba, *Van Meel in De Witte* 4719 (BR holotype, not seen, K isotype of *S. hirticalyx*).

Sudan Republic: *Broun* 1075 (mostly), 1633 (both K); *Hoyle* 323 (BM); *Kotschy* 72 (BM, K); *Pfund* 134 (K), 404 (K); *Sherif in Andrews* 4033 (K); *Schweinfurth* 962 partly (BM); 1046 partly (K).

Tanganyika: Pare District, 30 May 1915, *Peter* K 165 (K); Mpanda District, *Bullock* 2299 (K); *Thomas* s. n. (K); Kilosa District, *Peter* 32770 (K); Dodoma District *Busse* 266 (EA).

Nyasaland: Nyika Plateau, Mwanemba, 2400 m., *McClounie* 83 (K).

S. Rhodesia: Chipinga District, *Savory* 405 (K).

Trop. Bechuanaland: Middle of Ngami flats, *Van Son* in Transvaal Museum 28895 (PRE, holotype).

S. W. Africa: Caprivi Strip, *De Winter & Marais* 4869 (K, PRE).

Madagascar: Mouroundara, March 1869, *Grandidier* s. n. (P); near Majunga, *Perrier de la Bathie* 13003 (P) & *Humbert and Perrier de la Bathie* 2091 (P); Ambovambe, *Decary* 2599 (P), 3744 (P); Zambo Loramo, *Decary* 8039 (P).

2. **S. pachycarpa** *DC.*, Prod. 2: 265 (1825) p. p., *emend Guill. & Perr.*, Tent. Fl. Seneg. 200, t. 50 (1832); Phillips & Hutch. in Bothalia 1: 50 (1921) p. p.; Hutch. & Dalz., Fl. W. Trop. Afr. 1: 387 (1928) pro majore parte; Cronquist in Flore Congo Belge 5: 81 (1954); non sensu Bak. in Oliv., Fl. Trop. Afr. 2: 134 (1871) nec Berhaut in Bull. Soc. Bot. Fr. 99: 297-301 (1953) nec Hepper in Hutch. & Dalz., Fl. W. Trop. Afr. 2nd edn. 1: 532 (1958).

[*S. aculeata* sensu Guill. & Perr., Tent. Fl. Seneg. 198 (1832); Bak. in Oliv., Fl. Trop. Afr. 2: 134 p. p.; Phillips & Hutch. in Bothalia 1: 1921 p. p.; Hutch. & Dalz., Fl. W. Trop. Afr. 1: 387 (1928), non Pers.].

[*S. bispinosa* sensu Berhaut l. c. et Hepper l. c., non (Jacq.) W. F. Wight].

[*S. punctata* sensu Bak. l. c., p. p. et Hiern, Cat. Welw. Afr. Pl. 1: 230 p. p., non DC.].

S. sinuo-carinata Ali in Kew Bull. 13: 287 (1958).

α ssp. **pachycarpa**

Cape Verde Islands: Pico Pire, 10 Feb. 1866, *Lowe* s. n. (K); Fargo, *Lowe* s. n. (BM).

Senegal: *Heudelot* (K, ex herb. Hook.) 502 (P); *Perrottet* s. n. (P); *Sparrmann* s. n. [G lectotype (not seen), K, photo].

Gambia: *Ruxton* 146 (K).

Mali (Soudan): *Bellamy* 256 (P); *Ganay* s. n. (P); *Chevalier* 24903 (P).

Port. Guinea: *Espirito Santo* 2541 (K).

Guinea Republic: *Paroisse* 39 (P); *Pobeguin* 441 (K, P).

Sierra Leone: *Deighton* 1790, 2251, 5401, 5975; *Scott Elliot* 4219, 5220; *Small* 402; *Tindall* 46 (all K).

Ivory Coast: Cavally Basin, *Chevalier* 19776 (P).

Ghana: *Lloyd Williams* 549 (K); *Morton* A 90 (GC iso., K holotype of *I. sinuo-carinata*) 1303, 2101, 2241, 3776 (all GC) *T. Vogel* s. n. (K).

Niger Republic: *Chevalier* 28641 (K); *De Wailly* 5223 (P).

N. Nigeria: *Dalziel* 9 (mostly), 615; *Dent Young* 58; *Gwynn* 92; *Lely* 534, 586, P 598; *Moiser* 5; *Richardson* s. n.; *Sampson* 29 (all K).

S. Nigeria: *Dalziel* 1227; *Onochie* in FHI 34927; *Phillips* 13 (all K).

Brit. Cameroons: *McClintock* 32 (K).

Ubangi-Shari: *Chevalier* 5675 (K, P); *Le Testu* 3164 (P); *Tisserant* 1540 & 1678 (P), 5160 (K, P), 6942, 7635, 9756 (all P).

Ex French Congo: *Chevalier* 27645 (P).

Ex Belgian Congo: *Corbisier* 154, *Descamps* s. n., *Feller* A 28, *Hermann* 2144, *Verschueren* 551 (all BR).

Sudan Republic: near Gallabat, *Schweinfurth* 1867 (partly, BM), 1869 (K); Upper Nile, *Freeman & Lucas* s. n. (K).

Eritrea: Beni Amer: Carajoni, *Pappi* 161 (6300) (BM).

Uganda: Northern Province, *Tothill* 2654; Eastern Prov., *Chandler* 564, 1506, *Lind* 328; Buganda Prov., *Eggeling* 456 (all K).

Angola: *Dawe* 392 (K); *Gossweiler* 4811 (K); *Monteiro* s. n. (K); *Pearson* 2699 (K), *Welwitsch* 1994 (BM, K, P), *Young* 810.

β ssp. **dinterana** *Gillett* ssp. nov.

A ssp. *pachycarpa* bracteolis subpersistentibus 1-6 mm. infra basem receptaculi positis, dente carinae minus erecta, stylo haud pubescente et septis leguminis saepius paulo inter se distantioribus (6.5-8.5 non 6-7 mm.) differt.

Herba sublignosa annua vel haud diu perennans, 1-2 m. alta, caulibus glabris, saepius aculeatis, viridibus. *Stipulae* lanceolatae, margine fimbriato excepto, glabrae, c. 7 mm. longae,

caducae; rhachis folii ad 14 cm. longae, aculeata, glabra; petioluli glabri, 0.5-1 mm. longi; foliola 10-30-jugata, oblonga, glabra, basin inaequalia, apice mucronata, ad 13 mm. longa et 3.5 mm. lata. *Racemi* 3-5-flori, glabri, rhachi haud aculeata 1-4 cm. longa, pedunculo ad 1 cm. longo incluso; bracteae lineari-lanceolatae, ad 3 mm. longae saepe subpersistentes; pedicelli ad 11 mm. longi; bracteolae lineares, ad 2 mm. longae, subpersistentes, 1-6 mm. infra basem receptaculi dispositae. *Calyx*, margine sparse et minute lanato excepto, glaber, receptaculo 2 mm. longo, tubo 4.5 mm. longo, dentibus late triangulariis, breviter apiculatis, apice nigro, 1 mm. longis. *Vexillum* flavum extus dense nigro-purpureo maculatum, lamina subcordata, c. 1.8 mm. lata, c. 1.3 mm. longa, apice emarginata, ungue c. 5 mm. longo, supra mediam dilatato, appendicibus aliformibus anguste semilunariis c. 3 mm. longis et in media 1.3 mm. latis. *Alae* flavae, lamina inaequaliter elliptica c. 13 mm. longa et 6 mm. lata, basin hamo 2 mm. longo praedita; unguis abrupte curvatus, 4 mm. longus, 1.5 mm. latus. *Carinae* lamina albo-viridis, minute caeruleo maculata, semilunaris, apice rotundata incurvata, 6.5 mm. longa, versus apicem 9 mm., prope basin 3 mm. lata, ad basin dente 1.5 mm. longo, cum ungue angulam c. 30° formante, praedita; ungue recto, 7 mm. longo, 1.3 mm. lato. *Filamentorum* pars connata [9]-11-12-[15] mm. longa, 2-3 mm. supra basin valde dilatata (hic 3 mm. lata), partes liberae 3-4 mm., antherae 0.9 mm. longae. *Ovarium* 24-25-ovulatum, glabrum, c. 13 mm. longum, stylo glabro, incurvato, 4 mm. longo [*Legumen* erectum, curvatum, 12-25-spermum, ad 16 cm. longum, 4.5-5 mm. latum, c. 3 mm. crassum, 3-7 mm, rostratum, centro quam ad suturas crassius, septa inter se 6.5-8.5 mm. distantibus. *Semina* elliptica, minute atro maculata, 5.5 mm. longa, 3.3 mm. lata, 2.5 mm. crassa, hilo albo, circulare, subcentrale, a micropylo 1.3 mm. distante].

Angola: Moçamedes; near Mata dos Carpinteiros, in damp sandy thickets, July 1859, *Welwitsch* 1996 (K, LISU); Tampa, 800 m., river bank, annual, corolla yellow with brownish-purple spots, 1 June 1937, *Exell & Mendonça* 2423 (BM, COI, LISC); Birei 300-400 m., 30 May 1937, *Exell & Mendonça* 2342 (BM, COI); Km. 8 on the railway, desert, 1 June 1937, *Carrisso*

& Sousa 229 (BM, COI, LISC); Rio Mucungo, 12.6.1937, *Carrisso & Sousa* 302 (COI); Coastal Desert, 200 m., 23 Sept. 1954, *Pritchard* 395 (BM, COI, LISC); Pinda, Curoca 100 m., 6 April 1956, *Teixeira* 813 (COI).

South West Africa: Kaokoveldt: Sanitatas, 18° 16' S, 12° 40' E, by water holes, 28 Jan. 1958, *Merxmueller & Giess* 1450 (K); near Ohopoho, c. 18° 5' S, 13° 50' E, brown loam flats at foot of koppies, 1 April 1957, *De Winter & Leistner* 5290 (K, PRE, holotype); Ovamboland: Tiras (probable c. 18° S, 16° E), April 1885, *Schinz* 790.

Area inland from Swakopmund c. 21° 40' - 24° 20' S, 14° 40' - 16° 20' E:

Stringbank (on railway), *Rogers* 15265 (K); Karibid, on river gravels, 14 Feb. 1934, *Dinter* 7009 (BOL, K); Roessing berge, April 1934, *Boss* A 39 (PRE); near Roessing, by rivulets in Namib desert, March 1935, *Dinter* 8427 (K); Namib desert, in Canyon near Ganikontes near Swakop river, extremely dry, vegetation almost confined to river bed, 31 Oct. 1947, *Rodin* 2151 (K, PRE); garden of 'Palmen horst' near Swakopmund, a weed, Oct. 1948, *Wiss* 951 (PRE); Haikamchab, 26 Jan. 1907, *Galpin & Pearson* 7617 (K); Naibrivier, 25 April 1955, *Seydel* 452 (PRE); Naukluft mts., Blesskrantz, 1300 m., dry river bed, 12 March 1950, *Mrs. MacDonald* 487 (BM).

Variation: Welwitsch 1996 and some other Angolan specimens have rather shorter flowers than usual (filament sheath 9-10 mm.) and a carina blade lacking the toothed basal part. *Mrs. MacDonald* 487, from the extreme south of the species' range has unusually large flowers (filament sheath 15 mm. long) *Exell & Mendonça* 2423 has a slightly pubescent style, showing an aproach to ssp. *pachycarpa.*

The author's thanks are due to the botanists in charge of the herbaria of the British Museum, Brussels, Cape Town University, Coimbra, Geneva, Ghana University, Lisbon, Paris and Pretoria who have helped him to study the specimens in their care.

SOME NEW SPECIES OF *ERAGROSTIS* FROM SOUTHERN TROPICAL AFRICA

by

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Eragrostis aurorae Launert, spec. nov.

Gramen perenne, dense caespitosum. Culmi usque ad 70 cm alti, erecti, numerosi, graciles, tenuiter striati, ut videtur simplices, 1-3-nodes, teretes vel obtuse angulares. Foliorum vaginae striatae, juniores firmae arcte appressae, demum laxe appressae vel leviter divaricatae, dissite pilosae glabrescentes vel rare glabrae, ore plus minusve barbatae, inferiores persistentes in fibras copiosas brunneas fatiscentes; ligulae corona pilorum brevissimorum formatae; foliorum laminae (3) 5-12 (15) cm longae et 0.2-1 (1.5) mm latae, in exilitatem fastigiantur, plerumque involutae, filiformes, flexuosae, erectae, leviter curvatae, dissite pilosae vel glabrescentes vel rare glabrae, supra scaberulae, subtus laeves. Panicula erecta, 16-25 cm longa et 10-14 cm lata ovata vel elliptica, laxa, plus minusve stricta; rhachis apicem versus flexuosa tenuiter sulcata, glabra laevesque, rare obsolete scaberula; rami solitarii, patentes vel oblique ascendentes, filiformes, flexuosi vel subrigidi, glabri, obsolete scaberuli, laxe divisi, mediocriter spiculati; pedicelli 2-7 (10) mm longi, elegantes, glabri, laeves vel obsolete scaberuli, apice leviter incrassati. Spiculae 8-10 (12) mm longae et 1-1.2 mm latae, 5-8 (10)-florae, lineari-oblongae vel lineares, imbricatae, compactae, variegatae; rhachilla glabra, longe persistens, scaberula vel laevis. Glumae inequales lanceolato-triangulares, acutae, 1-nerviae, carinatae, glabrae, carinis scaberulae; gluma inferior plus minisve 2.5 mm longa; gluma superior 2.8-3 mm longa. Lemmata 3.2-3.4 mm longa et 1.6-1.8 mm lata, explanata

ovata vel ovato-elliptica, apice subacuta vel obtusa, 3-nervia, firma, chartacea, marginibus hyalinis, glabra, nervis lateralibus non prominentibus infra apicem evanescentibus, basin versus purpurea, apicem versus straminea. Paleae 3-3.2 mm longae, anguste ellipticae, apice oblique truncatae, carinis laeves. Lodiculae plus minusve 0.7 mm longae, obovatae apice oblique truncatae. Antherae 3, plus minusve 1.6 mm longae, oblongae. Caryopsis plus minusve 1.6 mm longa et plus minusve 0.6 mm lata, ambitu oblonga.

Distr.: ANGOLA. **Bié**: Vila da Ponte, XII. 1905, *Gossweiler* 2382 (K, typus).

Habitat: on sandy soil.

Eragrostis aurorae is a member of a group within Sect. *Eragrostis (Pteroessa* Doell; *Eueragrostis* Boiss.*)* which is typically represented by such species as *E. bicolor* Nees and *E. caesia* Stapf. It agrees with the species first mentioned in having variegated spikelets but differs by its more open and fewer-flowered ample panicle, its much longer lemmas and anthers and also by its usually filiform leaf-blades. *E. caesia* always has a more or less contracted panicle and broader and less imbricate spikelets. The lemmas in this latter species are somewhat shorter than in our new one and acute to mucronulate. Moreover it is also distinguishable from *E. aurorae* by its different habit.

Eragrostis mariae Launert, spec. nov.

Gramen perenne, dense caespitosum. Culmi usque ad 50 cm alti, numerosi, erecti vel leviter geniculato-ascendentes, teretes, simplices, validiusculi, 3-5-nodes, glabri, laeves, internodiis 4-10 cm longis, raro longioribus, saepius pro parte nudi (vaginis quam internodia brevioribus), apice exserti. Foliorum vaginae arcte appressae, firmae, leviter striatae, plerumque glabrae, rare sparseque pilosae, laeves, ore dense longeque barbatae; ligulae corona pilorum brevissimorum formatae; foliorum laminae (4) 6-15 (20) cm longae et 1-2 (3) mm latae, anguste lineares, in exilitatem fastigiantur, suberectae vel oblique patentes, invo-

lutae vel simpliciter plicatae, rare planae, firmae, flexuosae, sparse pilosae vel glabrescentes vel glabrae, subtus laeves, supra scaberulae vel laeves, tenuiter nervatae. Panicula erecta, ambitu ovato-oblonga vel elliptica, 10-15 (20) cm longa, 4-8 cm lata, laxa; rhachis flexuosa, obtuse angularis, glabra, scaberula; rami solitarii suberecti vel oblique patentes, laxe divisi, filiformes, flexuosi scaberuli, mediocriter spiculati; pedicelli 1.5-5mm longi, filiformes, scaberuli. Spiculae 4-10 mm longae et 2.5-3 mm latae, 5-16-florae, oblongae vel ovato-oblongae vel ellipticae, latere modice compressae, plerumque purpurascentes; rhachilla glabra, non articulata. Glumae lanceolatae, acutae, 1-nerves, caducae, carinatae, glabrae, carinis apice versus scaberulis; gluma inferior 2 25-2.5 mm longa; gluma superior plus minusve 3 mm longa, apicem glumae floriferae prope pertinens. Lemmata plus minusve 2.25 mm longa, explanata lanceolato-oblonga vel anguste elliptica, apice tricuspidata, inter aristas denticulata, leviter carinata, carinis scaberula, glabra, prominente 3-nervia, nervis lateralibus scaberulis. Paleae 1.8-2 mm longae, oblongae vel obovato-oblongae, e latere visa leviter curvatae, apice obtusae vel subtruncatae, irregulariter denticulatae, carinis ciliis flexuosis subpatentibus vel suberectis usque ad 0.4 mm longis ciliatae. Lodiculae minutae, obcuneatae, oblique truncatae. Antherae 3, plus minusve 1.25 mm longae, oblongae. Caryopsis ignota.

Nomen speciei in honorem collectoris avidae peritissimae *Mary Mc. Callum Webster* dedicatum.

NORTHERN RHODESIA. **Northern Prov.:** Abercorn Distr., Lake Chila, legit. *M. Mc. Callum Webster* A 30 (K, typus; SRGH).

Habitat: on forest edges.

This remarkable new species is doubtless closely related to *E. lappula* Nees and *E. uniglumis* Hackel. Both these species have ciliate paleas and a similar structure of the lemmas; but the lemmas in *E. mariae* are strongly tricuspidate because of the slightly excurrent nerves, whilst the lemmas in the two related species mentioned are always acute and never with nerves excurrent at the apex. In its habit our species is very similar to *E. lappula*. There is another species with excurrent

nerves: *E. crassinervis* Hackel found in the dryer parts of the Northern Transvaal and South West Africa. It differs in not having ciliate paleas, by the much shorter and gland-dotted lemmas, and by the anthers, which are only about as half as long as those of *E. mariae.*

Eragrostis desolata Launert, spec. nov.

Gramen ut videtur perenne, dense caespitosum. Culmi usque ad 70 cm alti, numerosi, erecti, teretes, simplices, uninodes vel enodes, glabri, laeves, copiosis glandulis minutis immersis ellipticis vel suborbicularibus instructis. Foliorum vaginae striatae, infirmae, non appressae, subteretes, inferiores fissae non persistentes, glabrae vel sparse pilosae vel glabrescentes, laeves; ligulae corona pilorum brevissimorum formatae; foliorum laminae 5-12(14) cm longae et 0.5-2(2.5) mm latae, anguste lineares, in exilitatem fastigiantur, erectae vel irregulariter patentes, plerumque involutae, rare planae, flexuosae, subteretes, sparse pilosae vel glabrescentes, scaberulae. Panicula erecta, (10)12-22(30) cm longa et 8-12(15) cm lata, ambitu ovata vel elliptica, laxa; rhachis stricta apicem versus flexuosa, obtuse angularis, tenuiter striata, glabra, laevis vel inconspicue scaberula, copiosis glandulis immersis vel crateriformibus rotundatis vel ellipticis instructis; rami solitarii, inferioribus remotis, patentes vel oblique adscendentes, laxe et simpliciter divisi, plus minusve stricti, mediocriter spiculati, inconspicue scaberuli vel laeves, glabri, copiosis glandulis crateriformibus et paucis glandulis annulariformibus instructis; pedicelli 2-8(12) mm longi, subcapillares, rectangulariter patentes vel oblique adscendentes, apicem versus scaberuli, glandulis immersis et annulariformibus instructis. Spiculae 5-9 mm longae et plus minusve 4 mm latae, 8-14-florae, oblongo-ellipticae, olivaceo-cinereae vel plumbeo-viridulae, latere modice compressae; rhachilla non discedens. Glumae subequales, plus minusve 1.6 mm longae, ovato-lanceolatae, acutae, 1-nerves, carinatae, glabrae, carinis apicem versus scaberulae. Lemmata 1.85-2 mm longa, et 1.4-1-6 mm lata, imbricata, explanata ovata vel late elliptica, acuta, membranacea, leviter carinata, glabra, 3-nervia, nervis lateralibus non prominentibus, infra apicem evanescentibus, carinis apicem versus

scaberula. Paleae lemmatibus paulo breviores, obovato-oblongae, apice truncatae, a latere visa leviter curvatae, carinis ciliis brevibus rigidis ciliolatae. Lodiculae minutae, plus minusve 0.4 mm longae, obcuneatae, apice truncatae. Antherae 3, plus minusve 1.2 mm longae, oblongae. Caryopsis 0.8-1 mm longa, ambitu oblonga, sectione obtuse trapeziformis.

SOUTHERN RHODESIA. **Eastern Div.**: Chimanimani Mountains, 1675 m, 18.v.1958, legit *O. West* 3638 (SRGH, typus) et 3656 (SRGH); same locality, 18.iv.1957, legit *Goodier & Phipps* 24 (SRGH).

Habitat: on sandy soil in grassland.

E. desolata is closely related to *E. sclerantha* Nees and *E. villosipes* Jedwabnick. It differs from both of these by the characters given in the scheme below. It has in common with them that the leaves turn rusty brown when dry, but they are always involute and narrower in our species whilst they are usually open and broader in the others. B. DE WINTER regarded *E. villosipes* as a mere variety of *E. sclerantha* («since the only differences seem to be those of size»). A closer examination shows that there are other differences, not important enough to maintain *E. villosipes* as a distinct species, but sufficient to regard it as subspecies of *E. sclerantha*. This view is supported by the geographical distribution of the whole group.

Eragrostis sclerantha Nees, Fl. Afr. Austr.: 388 (1841) subsp. **villosipes** (Jedw.) Launert, stat. nov.
Syn.: *E. villosipes* Jedw. in Bot. Archiv **5**: 202 (1924). *E. sclerantha* var. *villosipes* (Jedw.) de Winter apud Chippindall in Meredith, Grasses and Pastures of S. Afr.: 166 (1955).

E. sclerantha subsp. *sclerantha* is confined to the eastern Cape, Natal, and Transvaal; subsp. *villosipes* occurs in Bechuanaland, Southern Rhodesia, Northern Rhodesia, Nyasaland, Angola (the species was based on a gathering from Monhino — *Dekindt* 417 & 422 are syntypes — in Angola), and in sou-

thern Tanganyika. The glands, which occasionally occur on the culms and parts of the inflorescences of *E. sclerantha* subsp. *sclerantha* were overlooked in the past; they are neither mentioned by STAPF in his precise description in the Flora Capensis nor by DE WINTER *(loc. cit.)*.

E. sclerantha ssp. *sclerantha*	*E. sclerantha* ssp. *villosipes*	*E. desolata*
Lower leaf-sheaths with the bases densely woolly.	do.	Lower leaf-sheats glabrous or pilose but not with a woolly indument at the base.
Leaf-laminas usually flat, sometimes involute (2) 3-6 mm broad.	do.	Leaf-laminas usually involute, 0.5-2 (2.5) mm broad when expanded.
Culms up to 80 cm high, glabrous or rarely scattered-pilose, eglandular or with scattered sunken roundish glands.	Culms up to 150 cm high, ± densely puberulous, rarely glabrescent, eglandular.	Culms up to 70 cm high, glabrous, with sunken elliptic or roundish glands.
Panicles ovate to narrowly ovate, (3) 7-18 (25) cm long; branches smooth or sometimes scaberulous, eglandular or with some crateriform glands; pedicels (1) 2-3 mm long, eglandular or with some crateriform glands.	Panicles ovate-oblong, usually narrow, (12) 25--35 (40) cm long; branches scabrous, eglandular; pedicels 0.5-1.5 (2) mm long, eglandular.	Panicles ovate or elliptic, (10) 12-22 (30) cm long; branches smooth or scaberulous, with crateriform and rarely annular glands; pedicels (2) 4-8 (12) mm long, with crateriform glands, and usually with annular glands.
Spikelets ± spreading or sometimes somewhat appressed to the branches, olive-green or greyish-green, 8-12 (14)-flowered, 4-6 (8) mm long.	Spikelets always appressed to the branches, pale--olive sometimes somewhat reddish or brownish, (9) 12-16-flowered, 6-9 mm long.	Spikelets ± spreading, olive-green, 8-14-flowered, 5-9 mm long.
Lemmas 2-2.5 (2.9) mm long.	do.	Lemmas 1.85-2 (2.1) mm long.
Anthers 0.7-0.95 mm long.	do.	Anthers 1.2-1.3 mm long.

Eragrostis glischra Launert, spec. nov.

Gramen perenne, dense caespitosum, usque ad 40 cm altum. Culmi e rhizomate complures basi innovationes extravaginales erectas edentes, erecti vel leviter geniculati-adscendentes terectes, robusti, plurinodes, laeves, glabri, apice versus glutinosi, inferne ad internodia complura subaequilonga vaginis squamiformibus aphyllis quam internodia paulo brevioribus obtecti, superne usque ad inflorescentias vaginis obtectis; rami e vaginis superioribus singuli vel subfasciculati orti. Foliorum vaginae basales densissime imbricatae, persistentes, coriaceae, nitidae, glabrae laevesque, non striatae, aphyllae vel subaphyllae, superiores arcte appressae, firmae leviter striatae, breviter pilosae vel glabrescentes, vel glabrae, dorso copiosis glandulis oblongis vel ellipticis vel rotundatis conspicuis immersis seriatim instructis, ore versus plus minusve, glutinosae, ore leviter barbatae; ligulae corona pilorum brevissimorum formatae; foliorum laminae (2)3.5-9(13) cm longae et 2.5-5 mm latae, lineares, longe acutae, patentes vel oblique erectae, siccitate plerumque plus minusve spiraliter tortae, planae vel in statu sicco plus minusve involutae, juniores firmae vel rigidiusculae, glaucae, plus minusve pilosae vel glabrescentes vel glabrae, leves vel marginibus scaberulae, tenuiter nervatae, costis intermediis et rare marginibus glandulis conspicuis, oblongis vel ellipticis immersis instructis, plus minusve glutinosae. Panicula erecta, ambitu ovata vel late elliptica vel ovati-oblonga, (3) 5-7 (10) cm longa et 2.5-4.5 cm lata, plus minusve densa; rhachis rigidiuscula, scaberula, glabra, angularis; rami solitarii oblique patentes, laxe divisi, pauce spiculati, filiformes, rigidiusculi, scaberuli, plus minusve glutinosi; pedicelli robusti, usque ad 3 mm longi, scaberuli et rare glutinosi. Spiculae 5-10 mm longae et plus minusve 3 mm latae, 5-20-florae, ovatae vel ovati-oblongae vel oblongae, compressae, plerumque purpurascentes; rhachilla glabra, supra glumas et inter flosculos articulata et maturitate discedens. Glumae subequales, plus minusve 2 mm longae, ovatae, 1-nerves, acutae, demum deciduae, leviter carinatae, carinis apice versus scaberulis. Lemmata 1.8-2 mm longa, explanata ovati-oblonga, obtusa vel subobtusa, bene carinata, carinis apicem versus leviter scaberula, 3-nervia,

nervis lateralibus glandulis immersis oblongis vel ellipticis instructis. Paleae plus minusve 2 mm longae, oblongae vel obovati-oblongae, a latere visa curvatae, truncatae, carinis ciliis flexuosis patentibus usque ad 0.6 mm longis ciliatae. Lodiculae minutae, obcuneatae, truncatae. Antherae 3, plus minusve 1 mm longae, oblongae. Caryopsis ellipsoidea, in statu maturo ignota.

Extranea haec species propter habitum viscosum *Eragrostis glischra* nominata.

SOUTHERN RHODESIA. **Western Div.:** Wankie, 19.vi.1934, legit. *F. Eyles* 8027 (SRGH, typus; K); Shangani-Reserve, 1.iv.1951, legit *O. West* 3153 (SRGH); Mbathe Dam, 915 m, x.1951, legit *R. M. Davis* 409 (SRGH); same locality, iii.1951, legit *R. M. Davis* 7 (SRGH).

Habitat: on dry soil on stony ground.

From its sticky appearance and the ciliate paleas *E. glischra* seems to be related to *E. viscosa* (Retz.) Trin., but the latter species is always a tufted annual and quite different in some other important characters. Amongst the group of species with ciliate paleas it outwardly resembles *E. caespitosa* Chiovenda but differs from it both by having glands and in the different dimensions of the elements of the spikelet. *E. mildbraedii* Pilger shows some superficial similarities to *E. glischra,* but it differs from it completely in its lack of cilia on the paleas and in its narrower spikelets with persistent rhachillas, a character which removes it to another section of the genus. Finally *E. glischra* may be compared with *E. lappula* Nees, a species differing from our taxon in its habit, the dimensions of the elements of the spikelet and its ciliate lemmas. Moreover, *E. lappula* and the related *E. uniglumis* Hackel are both without any glands.

Eragrostis saresberiensis Launert, spec. nov.

Gramen perenne, caespitosum. Culmi usque ad 80 cm alti, erecti, graciles, stricti, teretes, simplices, 3-5-nodes, tenuiter striati, glabri laevesque; internodiis quam vaginae paulo longioribus, internodio summo breviter exserto. Foliorum vaginae distincte striatae, firmae, appressae, marginibus plus minusve

liberis, apicem versus pilis plus minusve patentibus e tuberculis ortis pilosae vel glabrescentes vel glabrae, laeves, ore plerumque leviter barbatae; ligulae corona pilorum perbrevium formatae; foliorum laminae (4.5) 8-20 cm longae et 0.5-1.5 (2) mm latae, anguste lineares, in exilitatem fastigiantur, flexuosae, plerumque filiformiter involutae, rare planae, erectae vel oblique patentes, basin versus pilis plus minusve patentibus e tuberculis ortis dissite pilosae vel glabrescentes, rare glabrae. Panicula 15-22 cm longa et 9-15 cm lata, ambitu late elliptica, erecta vel leviter nutans, effusa, laxa; rhachis filiformis, superne flexuosa, tenuiter sulcata, glabra laevis; rami solitarii, inferiores bini vel subfasciculati, plus minusve patentes, subcapillares, prope basin et superne laxe divisi, glabri, laeves; pedicelli 1-5 (7) mm longi, capillares, apice modice incrassati, glabri laeves. Spiculae 6-8 (10) mm longae et 1-1.25 mm latae, 4-7 (9)-florae, lateraliter compressae, lineares vel lineari-lanceolatae, acutae; rhachilla non articulata, glabra. Glumae bene inaequales; gluma inferior plus minusve 0.6 mm longa, plerumque enervia, lanceolato-triangularis, laevis; gluma superior 1.9-2 mm longa, 1-nervia, anguste lanceolata, acuta, carinata, subhyalina, glabra et laevis. Lemmata plus minusve 2.8 mm longa, explanata elliptica, acuta, 3-nervia, glabra apicem versus leviter scaberula. Paleae plus minusve 2.4 mm longae, ellipticae vel obovato-oblongae, apice truncatae et inter nervos irregulariter denticulatae, dorso apicem versus scaberulae, a latere leviter curvatae, carinis laevibus. Lodiculae minutissimae obcuneatae. Antherae 3, 1.6-1.8 mm longae, oblongae. Caryopsis plus minusve 1.2 mm longa, ambitu obovato-oblonga, latere compressa, brunnea.

SOUTHERN RHODESIA. **Central Div.:** Salisbury, 1465 m, 26.xii.1930, leg. *Brain* 5008 (SRGH, typus); Salisbury, i.1920, leg. *Eyles* 2430 (SRGH) et no. 2914 — 7.i.1921 — (SRGH). **Southern Div.:** Ndanga Reserve, 24.ii.1948, leg. *Robinson* 260 (SRGH, K).

Habitat: on sandy soil in damp places or along watercourses (as far as is known).

Eragrostis saresberiensis is known only from a few localities in Southern Rhodesia; it seems to be fairly rare. This delicate

species belongs to Sect. *Eragrostis* (*Pteroessa* Doell; *Euera-grostis* Boiss.) subsect. *Leptostachya* Nees, wherein it is probably nearly related to *E. heteromera* Stapf and *E. plana* Nees, both species having the lower glume extremely reduced as in our new one. *E. saresberiensis* may be distinguished from both of the species mentioned by having shorter lemmas and anthers and by the softer texture of the lemmas; from *E. heteromera* also by the shape and the size of the grain, which is narrowly spindle-shaped in that species. *E. plana* has also a different grain and is easily separable from our species by its much flattened culm and its fan-shaped base. Moreover *E. plana* has broader spikelets which contain more flowers than those of *E. saresberiensis*. Beside the two species mentioned, there is a group of species which show a relationship to *E. saresberiensis* comprising *E. rotifer* Rendle, *E. agrostoidea* Rendle, *E. beroensis* Rendle, and *E. airaeformis* Rendle; they all differ by having the branchlets of the inflorescence, at least the lower ones, arranged in whorls or pseudowhorls. In none of them are the glumes as unequal as in *E. saresberiensis* and there are other distinguishing characters, e. g. the glandular ring above and below the lowest whorl of the panicle present in *E. rotifer* and *E. agrostoidea* and the fact that the latter species and *E. beroensis* are both annuals.

Eragrostis paradoxa Launert, spec. nov.

Gramen perenne, densissime caespitosum. Culmi usque ad 30 cm alti, erecti, teretes, subtiles, simplices, 2-4-nodes, leviter striati, glabri, laeves, internodiis superioribus apice exserti. Foliorum vaginae superiores striatae, plus minusve firmae, arcte appressae, glabrae, laeves, ore leviter barbatea, inferiores persistentes, in fibras numerosas brunneas fatiscentes; ligulae corona pilorum brevissimorum formatae; foliorum laminae (5) 7-18 (25) cm longae et explanatae 0.5-1.5 (2) mm, latae, angustissime lineares, in exilitatem fastigiantur, convolute filiformes, erectae, flexuosae, plerumque leviter curvatae, glabrae, subtus laeves, supra scaberulae vel laeves. Panicula 5-8 cm longa et 3.5-7 cm lata, erecta, ambitu ovata, laxa, rhachis flexuosa, teris vel tenuiter canaliculata, glabra, laevis; rami

solitarii, oblique patentes, laxe dichotome-divisi, tenuiter filiformes, flexuosi, glabri, laeves vel leviter scaberulae, in alis seta instructi; ramuli breves, modice dichotome divisi; pedicelli 2-7 (10) mm longi, sub-capillares, apice leviter incrassati, glabri, leaves vel inconspicue scaberuli. Spiculae 8-10 (12) mm longae, et plus minusve 3 mm latae, 6-12-florae, ambitu oblongae vel lanceolato-oblongae, acutae, imbricatae, plumbeo-viridulae, opacae; rhachilla glabra, non articulata, longe persistens. Glumae forma subequales, ovato-lanceolatae, acutae, inconspicue 1-nerves, tenues, leviter carinatae, demum deciduae, glabrae laevesque; gluma inferior plus minusve 2.8 mm longa et 1.5-1.7 mm lata; gluma superior 3-3.2 mm longa et plus minusve 1.8 mm lata, $^2/_3$ glumae floriferae equans. Lemmata plus minusve 3.5 mm longa et 2.5-2.7 mm lata expansa late elliptica, apice subhyalina obtusa interdum plus minusve retusa, nervis 3 bene conspicuis apicem versus evenescentibus, glabra. Paleae longe persistentes, plus minusve 3 mm longae, ellipticae vel obovato-ellipticae, a latere visa curvatae, apice truncatae et plerumque leviter retusae, carinis laeves. Lodiculae plus minusve 0.3 mm longae, obcuneatae, apice leviter bilobatae. Antherae 3, plus minusve 1.3 mm longae, oblongae. Caryopsis in statu maturo ignota.

SOUTHERN RHODESIA. **Western Div.:** Matobo Distr., Farm Besna Kobila, 1465 m, i.1950, legit *O. B. Miller* 5710 (BM, typus; SRGH); et xii.1957 no. 4869 (SRGH); Matobo, 6.x.1947, legit *O. West* 2471 (SRGH). **Southern Div.:** Fort Victoria Commonage, 1.i.1948, legit *Robinson* 167 (SRGH).

Habitat: on shallow damp soil on rocks.

Because of the persistent rhachilla of the spikelet, which bears the long-remaining paleas, *E. paradoxa* belongs to Sect. *Eragrostis* (*Pteroessa* Doell; *Eueragrostis* Boiss.), but it seems there is no close relationship to any of the known species included in this section. The loose panicle with its dichotomous branching and the thinness of the lemmas do not occcur elsewhere in Subsect. *Megastachya* Benth. Finally our species is distinct from most of the other species of this group by the fact that the nerves of the lemmas do not reach the apex.

Remarkable in the new species is the splitting of the lower leaf-sheaths into fibres. This character as well as the dichotomous branching of the panicle occurs in some species of *Sporobulus*, a genus which is regarded by several authors as closely related to *Eragrostis*. Because of its similar habit, *E. paradoxa* may be mistaken for *E. pseudosclerantha* Chiov. or *E. patenti-pilosa* Hackel, but it can easily be distinguished by the characters mentioned above, and (both of the species have acute and thick, leathery lemmas with all the nerves reaching the top) by the very fine, filiform leaf-laminas, which are much shorter, broader and of a different consistency in the species with which I have compared it.

Eragrostis dentifera Launert, spec. nov.

Gramen perenne caespitosum. Culmi, usque ad 70 cm alti, plerumque erecti rare leviter geniculati-adscendentes, teretes, simplices vel e nodis inferioribus ramosi, 3-5-nodes, tenuiter striati, glabri laevesque. Foliorum vaginae tenuiter striatae, internodiis breviores, infirmae, laeves et plerumque glabrae; inferiores imbricatae coriaceae nitide stramineae aphyllae longe persistentes; ligulae corona pilorum brevissimorum formatae; foliorum laminae 5-12 (17) cm longae et 0.5-2.5 (4) mm latae, anguste lineares, in exilitatem fastigiantur, involuto-filiformes rare planae, flexuosae, plerumque erectae, laeves, supra dissite longeque pilosae vel glabrescentes, subtus glabrae. Panicula erecta, 10-16 (20) cm longa et 7-9 (12) cm lata, ambitu ovata usque late elliptica, laxa, multi-spiculata; rhachis firma, apicem versus flexuosa, angularis, glabra, scabra; rami solitarii oblique adscendentes vel suberecti, subfiliformes, plus minusve angulares, scabri, supra basin et superne laxe ramosi; pedicelli 2-4 (6) mm longi, filiformes, scaberuli. Spiculae (4) 6-10 (12) mm longae et 2-2.5 (2.75) mm latae, oblongae vel rare anguste ovato-oblongae, multi-florae, atro-olivaceae vel nigricantes, latere modice compressae; rhachilla glabra, non disarticulata. Glumae inequales, anguste ovatae, acutae, 1-nerves, carinatae, carinis apicem versus scaberulae; gluma inferior plus minusve 2.8 mm longa; gluma superior plus minusve 3.6 mm longa, apicem glumae floriferae prope pertinens. Lemmata plus minusve

3.2 mm longa et usque ad 2 mm lata, late elliptico-oblonga, 3-nerves, nervis plerumque prominentibus vel nervis lateralibus nonnunquam tenuioribus et rare subevanescentibus, apice profunde tridendata, dentibus nervigeris 0.8-1.2 mm longis acutis, lateralibus dens intermedius brevioribus, lobulis brevibus obtusis irregulariter denticulatis dentes interpositis, glabra, dorso scabriuscula. Paleae lemmatibus paulo breviores, obovato-oblongae, apice obtusae, a latere visa leviter curvatae, carinis ciliis brevibus subpatentibus vel adscendentibus 0.25-0.3 mm longis ciliolatae. Lodiculae minutae, obcuneatae, oblique truncatae. Antherae 3, plus minusve 1.2 mm longae, oblongae. Caryopsis 0.8-0.9 mm longa, cylindracea.

NORTHERN RHODESIA. **Northern Prov.**: Abercorn Distr., Lake Chila plain, 1675 m, 15.v.1952, legit *W. Siame* 202 (SRGH, typus) et 29.iv.1955, *W. Siame* 643 (SRGH).

Habitat: fairly common in dambos.

Eragrostis dentifera is remarkable for its deeply denticulate lemmas, being thus quite distinct from most of the other species of *Eragrostis*. There is one species occurring in the northern parts of South West Africa, *E. aristata* de Winter ined., which has the lemmas produced into short awns, but it is completely different from our plant. *E. aristata* is an annual species of quite different habit, the inflorescences are more or less contracted and the spikelets which are only 2-3-flowered are arranged in dense clusters on the branches. But the most important difference is that in *E. dentifera* the three-nerved acute sinuses are occupied by irregularly denticulate obtuse minor lobes, which are nerveless. Other species having the nerves of the lemmas excurrent are *E. crassinervis* Hackel and *E. mariae* of which the latter is also described and discussed in this paper. All the species mentioned have in common the persistent rhachis of the spikelets, thus forming a very distinct group within the whole genus, of which *E. dentifera* represents a very extreme species.

STUDIES IN AFRICAN *MALPIGHIACEAE*

by

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I. TWO NEW SPECIES AND TWO SUBSPECIES OF *TRIASPIS* BURCH.

Triaspis dumeticola Launert, spec. nov. (Tab. I)

Planta volubilis, elegans parce divaricata. Ramuli teretiusculi, tenuiter striati, laeves, 2-4 mm diametro, cortice griseo vel glaucescenti obtecti, novelli ± dense griseo-sericei vel pubescentes mox glabrescentes. Folia petiolata; lamina (3)4.5-10 cm longa et (1.8)2.5-6 cm lata, ovata, apice acuta, basi cordata vel subcordata, crasse herbacea, costis secundariis utrinsecus mediani 6-10 subtus prominulis, utrinque glabra vel rare dissite pilosa, supra obscure viridia subtus dilute viridia, margine integra, plana; petiolus (1.2)2-2.5 cm longus, gracilis, subcanaliculatus. Stipulae absentiae. Corymbi multiflori terminales axillaresque, sericei vel pubescentes valde glabrescentes; pedunculis corymbiferis 1.5-5 cm longis; bracteis triangulari-subulatis acutis ± 1.5 mm longis, pubescentibus vel glabris; bracteolis subulatis ± 1 mm longis. Flores hermaphroditi, pentameri, distincte zygomorphi ± 1.8 cm diametro. Sepala ovati-oblonga vel late elliptica ± 2.8 mm longa, plerumque glabra, rare dissite pilosa. Petala unguiculata, alba et rubicunde adspersa, patentissima vel reclinata, valde inaequalia; quintum navicullariforme ± 8.8 mm longum marginibus totaliter fimbriatum, altera ovata vel late elliptica ± 8 mm longa basin versus fimbriata. Stamina longe exserta; antherae oblongae ± 2 mm longae; filamenta inter se libera, filiformia, glabra, 5-5.6 mm longa. Ovarium ± dense sericeum. Styli 3, glabri ± 4.8 mm longi, apice leviter incrassati. Samara in statu maturo ignota; crista dorsalis instructa.

DISTR.: **Southern Rhodesia**; Matobo, Malema Dam, 1300 m, fl. xii. 1959, *O. B. Miller* 7013 (K, holotypus; SRGH, isotypus).

HABITAT: On edges of woodland.

Triaspis dumeticola is closely related to *T. nelsonii* Oliver but differs from it by its true climbing habit, the several times larger leafblades, which are long petiolate whilst the leaves in *T. nelsonii* are always sessile or nearly so. Furthermore, *T. nelsonii* is a shrublet with radiating stems, and only the branchlet tips are tending to climbe.

Triaspis suffulta Launert, spec. nov.

Frutex scandens usque ad 5 m altus, multiramosus; ramulis subpatentibus. Ramuli teretiusculi, glabri vel glabrescentes, mox cortice griseo-brunneo vestiti, dissite lenticelliferi, internodia foliis subpatentibus aequilonga vel eis longiora. Folia petiolata; lamina 3.5-4 cm longa, 2.2-2.5 cm lata, ovati-oblonga ad oblonga, apice obtusa interdum leviter retusa, basi rotundata vel subcordata, subcoriacea, costis secundariis utrinsecus mediani 4-8 non prominulis, utrinque glabra vel subtus novella ± dense sericea mox glabrata, supra pallide viridia, subtus glauca, eglandulosa vel subtus supra basim glandulis 2 circularibus impressis inconspicuis ornata; petiolus 0.5-1.2 cm longus, teretiusculus vel tenuiter canaliculatus, sericeus vel glabratus. Stipulae absentiae. Corymbi multiflori, ramulos terminantes ad folia annotina axillares et plerumque sub ipsis ad apicem internodii 2-3 cm longi 2 foliola brevipetiolata vel sessilia 0.4-1.5 cm longa et 0.4-1.3 cm lata suborbicularia ad elliptica vel ovati-oblonga apice obtusa apiculateque subtus inconspicue reticulata gerentes; bracteis ovati-lanceolatis usque ad 2 mm longis; bracteolis lanceolatis brevissimis. Flores hermaphroditi, pentameri, distincte zygomorphi, 12-15 mm diametro. Sepala ovati-oblonga ad oblonga, 2.4-2.9 mm longa et ± 1.6 mm lata, extus sericea. Petala reclinata, unguiculata ± 7.5 mm longa marginibus dimidio inferiore fimbriata, quintum navicullariforme, altera cochleariformis. Stamina exserta; antherae oblongae, ± 1.6 mm longae; filamenta inter se libera, glabra, ± 4 mm longa. Ovarium ± dense sericeum.

Styli 3, glabri, 4-5 mm longi, apice leviter incrassati. Samarae puberulae vel glabrae; ala lateralis ovata ad ovati-triangulata, 2.5-3.3 cm longa et 1.7-2.3 cm lata, apice obtusa vel subobtusa raro acuta, rigidi-coriacea; ala dorsalis absens.

DISTR.: **Mozambique**; Vilanculos, fl. & fr. 27.iii.1952, *Barbosa & Balsinhas* 5006 (BM, holotypus).

HABITAT: Climbing in trees or shrubs on dunes near the coast.

Triaspis suffulta is doubtlessly closely related to *T. glaucophylla* Engler, a shrub which occurs in the Lydenburg District of Transvaal. It may be keyed out from it as follows:

1) Weak shrub with radiating stems and sometimes twining branchlet tips. Lamina of the leaves of the main-stem and the vegetative branches not different from those attached to the inflorescence, subcircular, subreniform or broadly ovate. Side-wing of the samara oblong or elliptic ..... *glaucophylla*

1) Scandent shrub, usually climbing on trees. Lamina of the leaves of the main-stem and the vegetative branches different in shape and size from those attached to the inflorescence, ovate-oblong to oblong ..... *suffulta*

Triaspis macropteron Welw. ex Oliv., Fl. Trop. Afr. **1**: 281 (1868)
subsp. **massaiensis** (Niedenzu) Launert, stat. nov.

Typus subspeciei: Tanganyika; Kagehi, *Fischer* 66 (K).
Syn.: *Triaspis stipulata* Engler, Bot. Jahrb. **43**: 382 (1909) non Oliv. (1868).
Type from Tanganyika; Ugogo-Steppe, Kilimatinde, *Claus* s. n.
Triaspis massaiensis Engler ex Niedenzu in Engler, Pflanzenr. IV, 141: 52 (1928) in syn.
Triaspis macropteron var. *speciosa* forma *massaiensis* (Engler) Niedenzu in Verz. Vorl. Akad. Braunsb.

S.-Sem. **1924**: 7 (1924); in Engler, Pflanzenr. IV, 141: 52 (1928). — Brenan, Tanganyika Territory Checklist **2**: 296 (1949).

Type as for the subspecies above.

Triaspis speciosa Niedenzu in Engler, Pflanzenw. Ost-Afr. **C**: 232 (1895).

Syntypes from Tanganyika: *Stuhlmann* 4319 (B †) & 4575 (B †) and *Fischer* 290 (B †; K).

Triaspis macropteron var. *speciosa* forma *brevistipulata* Niedenzu, loc. cit. pro parte.— Brenan, loc. cit.

Type from Tanganyika: *Fischer* 290 (B †; K).

Triaspis nelsonii Oliv. in Hook., Ic. Pl.: t. 1418 (1883) subspec. **canescens** (Engler) Launert, stat. nov.

Typus subspeciei: Mozambique; Ressano Garcia, fl. 18.xii. 1897, *Schlechter* 11827 (B †; K, lectotypus).

Syn.: *Triaspis canescens* Engler, Bot. Jahrb. **36**: 249 (1905). — Niedenzu in Arb. Bot. Inst. Akad. Braunsb. **6**: 26 (1915); in Verz. Vorl. Akad. Braunsb. S.-Sem. **1924**: 7 (1924); in Engler, Pflanzenr. IV, 141: 47 (1928).

II. A NEW VARIETY OF *ACRIDOCARPUS NATALITIUS* A. JUSS.

Acridocarpus natalitius A. Juss. in Archiv. Mus. Paris **3**: 486 (1843) var. **linearifolius** Launert, var. nov.

Typus varietatis: Mozambique, Magude, Mapulanguese, *Torre*, 6564 (LISC). Tab. II.

Syn.: *Acridocarpus pondoensis* Engler ex Niedenzu in Arb. Bot. Inst. Akad. Braunsb. **7**: 7 (1921); in Engler, Pflanzenr. IV, 141: 265 (1928) e descr.

Typus: Pondoland, am Rande des Egosawaldes, 200-500 m, *Beyrich* 94 (B †).

The differences between the 2 varieties of *A. natalitius* are as follows:

1) Leaf-lamina oblong, oblanceolate, oblong-obovate or oblong-oblanceolate, always broader than 1 cm ... var. *natalitius*
1) Leaf-lamina linear or linear-oblanceolate, 0.5-1 (1.3) cm broad ..... var. *linearifolia*

The type of *A. pondoensis* was destroyed in Berlin during the war, but according the description there is no doubt that Engler had our taxon in mind when he described his species. The differences between *A. natalitius* and *A. pondoensis* are only those of the shape and size of the leaf-lamina as indicated above. There are so many transitional forms linking our variety with the typical *A. natalitius* that one might even be inclined to regard this taxon as a mere form of it. Both the varieties are found growing together.

III. A REVISION OF THE CONTINENTAL AFRICAN SPECIES OF *SPHEDAMNOCARPUS* PLANCH. (SERIES *MICROCARPI* ARÈNES)

Athough the genus *Sphedamnocarpus* has been revised twice within the last 35 years [by Niedenzu in Engler, Pflanzenr. VI, 141: 252-258 (1928) and by Arènes in Notul. Syst. **11**: 97-123 (1943)] the vast amount of material which has come in, mainly in the last decade, collected in South and Southern Tropical Africa has made it necessary to change the conception outlined by the authors mentioned above. As regards history, delimitation and relationship of the genus, everything important will be found in the works cited. Unfortunately the brillant botanist Arènes concentrated his valuable studies mainly on Madagascar species and did not pay much attention to the species of the mainland of which the material is mainly to be found in the Herbaria of the British Museum, Kew, Coimbra, Lisbon, Pretoria, Salisbury, etc.

1) Leaf-lamina sericeous-tomentose on both surfaces (usually less so on the upper one), or only underneath and glabrescent above 2

2) Plant an erect or suberect, sometimes trailing shrub or shrublet, or sometimes with the branchlet tips twining. Leaves of the main stems usually ternate, rarely opposite, and very rarely pseudo-alternate; densely sericeous-tomentose on the lower, less so or occasionally glabrescent on the upper surface; petiole 2-3 (5) mm long ..... 2. *angolensis*

2) Plant always a true climber, with stems never shrubby. Leaves of the main stems strictly opposite (only very rarely some basal ones in threes), densely sericeous-tomentose on the lower surface, glabrous, glabrescent or with a persistent arachnoid or tomentellous indumentum on the upper one; petioles (4) 7-40 mm long ..... 3. *pruriens*

1) Leaf-lamina glabrous or sparsely strigose 3

3) True climbers with stems always twining, never shrubby ..... 4. *galphimiifolius*

3) Erect or rarely trailing shrubs or shrublets, but sometimes with twining branchlet tips 4

4) Leaf-lamina 5.5-9 × 2.3-3.75 cm. Strongly erect shrub or shrublet (occurring in Angola)..... ..... 1. *barbosae*

4) Leaf-lamina 1.2-3 cm × 0.5-1.5 cm. Lax shrub or shrublet, sometimes trailing, with usually twining branchlet tips (occurring in the Transvaal and eastern Bechuanaland)..... 5. *transvalicus*

N. B.: In the following enumeration full descriptions are omitted (except for the new species); they will be found in my treatment of *Malpighiaceae* in Flora Zambesiaca Vol. 2, p. 1, which is now in course of preparation.

1. **Sphedamnocarpus barbosae** Launert, spec. nov.

Frutex erectus usque ad 90 cm altus, e rhizomate robusti pluricipiti oriens, sparse divaricatus. Ramuli stricti, 2-5 cm diametro, cortice brunneo vel rubescenti obtecti, ± dense strigosi, tarde glabrescentes, laeves; internodia foliis oppositis breviora. Folia brevissime petiolata; laminae 5.5-9 × 2.3-3.75 cm, late lanceolatae usque oblongo-lanceolatae, apice subobtusae, apiculatae, basi cuneatae, subcoriaceae, utrinque latere glabrae vel juventute subtus strigosae, supra virides, subtus dilute virides vel glaucae, glandulis 2 circularibus, sessilibus, inconspicuis, marginalibus utrinque secus mediani prope apicem petioli affixis, margine integerrimae siccitate leviter involutae, costis secundariis utrinsecus mediani 4-7 supra non depressis et subtus prominulis percursae; petioli 2-3 mm longi; stipulae absentiae. Inflorescentiae strigosae, in apicibus ramulorum vel/et axillaribus quasi paniculam 10-15 cm longam amplam formantes, umbellis parcis 4-floribus compositae; bracteae bracteolaeque non suppetunt; pedicelli fructiferi usque ad 4 cm longi. Flores pentameri, actinomorphi. Sepala sub fructu 6-7 mm longa, oblonga, extus ± dense sericea. Petala delapsa. Stamina 10, glabra, aequalia; antherae ± 1.5 mm longae, oblongae, basi subcordatae; filamenta 3-4 mm longa, basi libera. Ovarium densissime sericeum; styli 3, ± 5 mm longi. Samarae 2-3, 18-24 mm longae; ala juventute dense sericea, in statu maturo leviter strigosa vel glabra, rubescens, oblique obovata, apice obtusa, basi 8-10 mm, superne 11-13 mm lata, margine integra vel levissime irregulariterque sinuosa.

Nova haec species clarissimo exploratori florae Angolensis et excellentissimo collectori *G. Barbosa* dedicata.

DISTR.: **Angola**, Bailundo prope Nova Lisboa, 26.iii.1960, legit *G. Barbosa & R. Correia* 8889 (LUA, holotypus); Nova Lisboa, 17.v.1937, leg. *L. W. Carrisso & F. Sousa* 67a (BM; COI; LISC) [This specimen is mentioned in Exell & Mendonça, Consp. Fl. Angol. **1**: 253 (1951) as *Sphedamnocarpus* sp. and supposedly new, but it could not then be described because of its incompleteness]. See Tab. V.

HABITAT: Open woodland.

A. barbosae is doubtless closely related to *A. angolensis;* it may be keyed out from that species as follows:

angolensis	*barbosae*
Leaves of the main stem usually ternate (see key); leaf-lamina 3.5-6 × 1.5-2.5 cm, always rounded at the base, densely sericeous-tomentose, rarely glabrescent on the upper surface; trabecules of the hairs of the leaf-lamina up to 1.6 mm long.	Leaves always opposite; leaf-lamina 5.5-9 × 2.3-3.5 cm, cuneate at the base, glabrous or only somewhat strigose on both surfaces; trabecules of the hairs of the leaf-lamina up to 1.9 mm long.

2. **Sphedamnocarpus angolensis** (A. Juss.) Planch. ex Oliv., F. T. A. **1**: 279 (1868). — Hiern, Cat. Afr. Pl. Welw. **1**: 104 (1896) — Niedenzu in Arb. Bot. Inst. Akad. Braunsb. **6**: 48 (1916); in Verz. Vorl. Akad. Braunsb. S.-Sem. **1924**: 17 (1924); in Engl., Pflanzenr. IV, 141: 255 (1928) — Burtt Davy Man. Fl. Pl. & Ferns Transv. **2**: 284 (1932). — Exell in Journ. of Bot. **65**, Suppl Polypet.: 51 (1927). — Gossweiler & Mendonça, Carta Fitogeogr. Angola: 160, 161 (1939). — Arènes in Notul. Syst. **11**: 121 (1943) — Exell & Mendonça, C. F. A. **1**: 252 (1951).

Typus: Angola: Cuanza Norte, Lopolo, *Welwitsch* 1043 (COI, holotype; BM; K).

Acridocarpus (?) *angolensis* A. Juss. in Ann. Sci. Nat. Bot. Sér. 2, **13**: 272 (1840); in Archiv. Mus. Hist. Nat. Par. **3**: 490 (1843). Type as above.

Sphedamnocarpus pulcherrimus Engl. & Gilg. in Warb., Kunene-Samb. Exped. Baum: 272 (1903). Typus: Angola (Bié, *Baum* 588 B †; BM; K).

Sphedamnocarpus angolensis var. *pulcherrimus* (Engl. & Gilg) Niedenzu in Verz. Vorl. Akad. Braunsb. S.-Sem. **1924**: 17 (1924); in Engl., Pflanzenr. IV, 141: 255 (1928). Type as above.

DISTR.: Angola (Benguela, Bié and Huíla), Northern Rhodesia, Southern Rhodesia, Nyasaland, Transvaal (See Tab. V).

Selected citation of specimens examined:

ANGOLA: See Consp. Fl. Angol. **1**: 252 (1951) for specimens.

NORTHERN RHODESIA: Barotse Distr., Sesheke, *Angus* 1001 (FHO; K); *Borle* in Nat. Herb. Pret. 28709; Batoka Plateau,

Allen 444 (K; SRGH); Abercorn, *Merkel* (BM); Mapanza, *Robinson* 1346 (SRGH); Katomo, *Rogers* 8233 (K; SRGH).

SOUTHERN RHODESIA: Goromonzi, *Jack* 16235 (SRGH); Matobo, *Miller* 4363 (SRGH); *Eyles* 108 (BM); *Plowes* 1409 (SRGH); *Cheesman* 81 (BM); Bulawayo, *Rogers* 13095 (K); *Eyles* 96 (SRGH); *Saunders Davies* 29.i.1934 (BM); Near Salisbury, *Cecil* 145 (K); Salisbury, *Eyles* in Nat. Herb. Pret. 35942 (PRE); *Penny* 5726 (SRGH); *Godman* 188 (BM); *Brain* 8383 (SRGH); *Pardy*, 8.ii.1950 (SRGH); *Rand* 1405 (BM); *Stent* 5630 (SRGH); *Arnold* 9514 (SRGH); Marandellas, *Rattray* 809 (K; SRGH); *Stent & Rattray* 3653 (SRGH) & 3652 (PRE); *Newton* 69 (SRGH); *Corby* 301 (K; PRE; SRGH); Plumtree, *Flanagan* 3181 (PRE). Victoria, *Monro* 781 (BM); Nyamandlhovu, *West* 3180 (K; SRGH); Gwampa Vley, *Goldsmith* 33/54 (SRGH); Rusape, *Hopkins* 7043 (K; SRGH); Odzani River Valley, *Teague* 349 (K).

NYASALAND: Lilongwe, *Jackson* 2153 (SRGH).

TRANSVAAL: Pretoria, *Meeuse* 9241 (K; PRE; SRGH). South African Goldfields (Sand Spruit?), *Baines* 31.v.1871 (K).

Note: As to *S. pulcherrimus* ENGLER & GILG (l. c.) indicate, «die neue, sehr schoen bluehende Art ist verwandt mit *Sphedamnocarpus angolensis*», but they do not discuss the differences. After NIEDENZU (l.c.) *S. pulcherrimus* differs from «typical» *S. angolensis* by «Folia e basi rotunda vel subcordata oblonga vel ovali- s. lanceolato-oblonga, apice obtuso vel retuso, apiculata, usque 5 cm longa et 2 1/3 cm lata, supra demum subglabrata». All these characters are to be found within the range of variability of *S. angolensis*. The type-specimen of *S. pulcherrimus* (*Baum* 588) belongs to one of the few gatherings which have the leaves arranged pseudoalternately.

3. **Sphedamnocarpus pruriens** (A. Juss.) Szyszyl., Polypet. Discifl. Rehm.: 2 (1888).— Niedenzu in Arb. Bot. Inst. Akad. Braunsb. **6**: 49 (1915); in Verz. Vorl. Akad. Braunsb. S.-Sem. **1924**: 18 (1924); in Engl. Pflanzenr. IV, 141: 257 (1928). — Burtt Davy, Man. Fl. Pl. Ferns Transv. **2**: 284 (1932). — Arènes, Notul. Syst. **11**: 119 (1943). Type from Natal.

Banisteria pruriens E. Mey. ex Drège, Cat. Pl. Exsicc. Afr. Austr.: 19 (1838) nom. nud.

Acridocarpus (?) *pruriens* A. Juss., Malpigh. Synops.: 272 (1840); in Archiv. Mus. Par. **3**: 492 (1843). — Sond. in Harv. & Sond., Fl. Cap. **1**: 232 (1860). Type as above.

Sphedamnocarpus pruriens f. (I) *longipedunculatus* Niedenzu in Verz. Vorl. Akad. Braunsb. S.-Sem. **1924**: 18 (1924); in Engler, Pflanzenr. IV, 141: 257 (1928).

Sphedamnocarpus pruriens f. (III) *brevipedunculatus* Niedenzu in Verz. Vorl. Akad. Braunsb. S.-Sem. **1924**: 18 (1924).

Sphedamnocarpus pruriens var. *platypterus* Arènes in Notul. Syst. **11**: 120 (1943).

Syntypes: Mozambique, Delagoa Bay, *Junod* 497 (P?) and Lourenço Marques, *Borle* 350 (SRGH).

As is typical for climbing plants, for plants with a wide distribution and for savanna plants *S. pruriens* shows a very wide range of variation especially in the shape and size of the leaves (see Tab. III-IV), but there are more characters such as the length of internodes and the size and shape of the samara-wings. In the past when botanists based their taxa on a few or sometimes only on a single specimen, several species or infraspecific taxa were described which cannot be maintained after examining the great amount of material now available. The first difficulty arises in distinguishing between *S. angolensis* and *S. pruriens*. The first species is based on a specimen from Angola; *S. pruriens* on a gathering from Natal. *S. angolensis* has its centre of distribution in Southern Angola (see Tab. V) and extends to Northern and Southern Rhodesia and to the northern parts of Transvaal and Nyasaland, whilst *S. pruriens* occurs from Mozambique to the Transvaal, Bechuanaland, the northern parts of South West Africa and Southern Rhodesia and the extreme south of Nyasaland. At the centres of their distributions both the species are easily recognisable by their habit alone (see key) but in the regions where the areas overlap there are specimens that show characters of both species. These may represent hybrid swarms. My colleague B. DE WINTER suggested that both species should be regarded only as subspecies or varieties of one single species. I cannot follow his view, and I think we must regard both species as quite distinct when taking into consideration the combination of characters

(given in the key) which separate them. Further field studies may elucidate the possible hybrid nature of the transitional forms mentioned.

Within *S. pruriens* it is impossible to maintain the infraspecific taxa of Niedenzu and Arènes. The characters on which they were based can often be seen on a single gathering. Studying the material available I came to the conclusion that only two varieties — formely regarded as species — can be maintained, and even these are very often only recognisable in their typical forms as shown in Tab. III and IV; 1 + 2.

1) Leaf-lamina glabrous or glabrescent on the upper surface, ovate, subcircular, or ovate-oblong, rarely elliptic, apex obtuse to acute, base cordate or rounded 2
   2) Leaf-lamina subcircular, ovate-elliptic, ovate-oblong or elliptic, apex obtuse sometimes slightly retuse, apiculate, coriaceous . . . . . var. *pruriens*
   2) Leaf-lamina ovate, rarely ovate-elliptic, apex acute or subacute, apiculate, subcoriaceous to stiffly herbaceous . . . . . var. *latifolius*
1) Leaf-lamina on the upper surface tomentellous or arachnoid, very rarely glabrescent (only older ones), lanceolate, rarely ovate-lanceolate, apex acute, base rounded to broadly cuneate . . . . . var. *lanceolatus*

var. **pruriens**

DISTR.: Natal, Mozambique, Transvaal, northern South West Africa, Bechuanaland, Southern Rhodesia, Nyasaland (see Tab. VI).

Selected citation of specimens studied:

NATAL: Port Natal, *Gueinzius* 391 & 139 (S); *Drège* s. n. (K; S); *Gueinzius* s. n. (BM; K); *Harvey* s. n. (1840) (K); without precise locality, *Sutherland* s. n. (K); *Plant* 70 (BM; K; S); Lower Tugela, *Edwards* 1898 (K). Magut, *Gerstner* 4592 (K) — this specimen is different from all the others by having a very dense velvety indument on the leaf-lamina which does not

seem to disappear on the upper surface; Durban, *M. Wood* 274 (BM); Inanda, *M. Wood* (BM); Zululand, *Gerrard* 66 (BM).

MOZAMBIQUE: Lourenço Marques, *Torre* 7355 (LISC); *Sousa* 83 (LISC; PRE); *Barbosa & Lemos* 8260 (LISC; SRGH); *Borle* 350 — Typus of var. *platypterus* Arènes — (SRGH) & 967 (SRGH). Manica e Sofala, *Torre* 4253 (LISC); *Pedro & Pedrógão* 5759 (SRGH); *Barbosa* 1132 (BM; LISC) & 1225 (BM; LISC); Chipinga, *Hack* 67/50 (SRGH); Mount Maruma, *Swynnerton* 1759 (BM); Morrumbala, *Barbosa & Carvalho* 3059 (LISC; LUA; SRGH); *Torre* 5229a (LISC).

SWAZILAND: Hlatikulu, *Stewart* 80 (K).

TRANSVAAL: Pretoria, *Rehmann* 4194 (BM); *von Wickerk & Wasserfall* 62 (PRE); *Mogg* 12315 (PRE); Rustenburg, *Rogers* 2344 (K); *Sutton* 825 (K; PRE; SRGH); *Pegler* 1110 (PRE); Barberton, *Williamson* 275 (PRE); *M. Wood* 4169 (K); *Buchanan* 27 (K); Nelspruit, *Rogers* 21020 (K); Naboomspruit, *Galpin* 47 (PRE); Waterberg, *Codd* 8458 (PRE); *Meeuse* 9082 (PRE); Krueger Nat. Park, *Schyff* 2141 (K); Lydenburg, *Galpin* 13282 (K); Pietersburg, *Bolus* 11022 (K; PRE); Belfast, *Smuts* 298 (K); Makapansberg, *Rehmann* 5493 (K); Without precise locality, *Brueckner* 476 (PRE; SRGH); *Sanderson* s. n. (K).

SOUTH WEST AFRICA: Caprivi strip, *Leistner & Killick* 3183 (K; M; PRE); Okavango Native Territ., *de Winter & Marais* 4713 (K; PRE); Otavi, *Dinter* 5550 (PRE); Grootfontein Nord, *Merxmüller* 1814 (BM; K; M); Grootfontein, *Schoenfelder* 564 (PRE); *Story* 6363 (PRE); *de Winter* 2854 (PRE); Kangongo, *de Winter & Wiss* 4450 (PRE); Damaraland, *Een* s. n. (BM).

BECHUANALAND PROTECTORATE: Mochudi, *Rogers* 6489 (K); Gaberones, *van Son* 28943 (BM; K; PRE; SRGH); Kgatla (?), *Reineke* 39A (PRE); Molepolole, *Story* 4874 (K; PRE). Kanye, *Miller* B 1282 (PRE).

SOUTHERN RHODESIA: Shamva, *Eyles* 2247 (SRGH); Matobo, *West* 2899 (SRGH); *Miller* 1421 (SRGH); Filabusi, *Davies* 133 (SRGH); Bubi, *Goldsmith* 30/54 (K; SRGH). Bulawayo, *Rand* 431 (BM); Plumtree, *Davies* 535 (SRGH); Premier Mine, *Martineau* 243a (SRGH); Bulalima-Mangwe, *Feiertag* 45558 (K; SRGH); Marandellas, *Stent* 5449 (PRE; SRGH); Mt. Silinda, *Hack* 40 (SRGH); Melsetter, *Swynnerton* 211 (BM; K); Umtali, *Chase* 2126

& 193 (BM; K; SRGH); Lundi Drift, *Smuts* in Nat. Herb. Pret. 28708 (K; PRE); Lundi River, *Hutchinson & Gillett* 3290 (BM; K).

NYASALAND: Isonge Hill, *Banda* 91 (K).

var. **latifolius** Engler in Bot. Jahrb. **36**: 249 (1905).

Syn.: *Sphedamnocarpus latifolius* (Engler) Niedenzu in Arb. Bot. Inst. Akad. Braunsb. **6**: 48 (1915); in Verz. Vorl. Akad. Braunsb. S.-Sem. **1924**: 17 (1924); in Engler, Pflanzenr. IV, 141: 256 (1928).— Burtt Davy, Man. Fl. Pl. & Ferns Transv. **2**: 284 (1932).— Arènes in Notul. Syst. **11**: 120 (1943).

Typus variet.: Transvaal, am grossen Wasserfall bei Lydenburg, *Wilms* 145 (B †; BM, lectotypus).

DISTR.: Natal, Mozambique, Transvaal (see Tab. V).

Selected citation:

NATAL: Without precise locality. *Gerstner* 4592 (PRE).

MOZAMBIQUE: Lourenço Marques, Goba, *Barbosa & Lemos* 8260 (BM; LISC; SRGH); *Sousa* 4219 (PRE).

TRANSVAAL: Barberton, *Holt* 43 & 50 (PRE); Pilgrims Rest, *Strey* 3331 (PRE); Pretoria, *Rensburg* s. n. (PRE); Lydenburg, *Wilms* 145 (BM; K); Pigg's Peak, *Compton* 27640 (PRE); Nelspruit, *Codd* 5195 (K; PRE); Rustenburg, *van Dam* 30252 (PRE); Houtboshberg, *Schlechter* 4413 (BM).

Note: Arènes regarded *S. latifolius* as a distinct species. From the other species (*S. angolensis* and *S. wilmsii*) he keyed it out as follows (see op. cit. pag. 106): « Feuilles adultes à la fin soyeuses-tomenteuses ou velues-cendrées sur les deux faces, plus faiblement en dessus ». This applies very well to the two remaining species, but not to *S. latifolius;* it can be shown that the upper surface of the leaf-lamina is glabrescent, even in the type-specimen. *S. pruriens* var. *latifolius* differs from the typical variety in being much more slender and more delicate as well as in its leaf-shape. As to the leaf-shape the question arises whether our taxon might not be a natural hybrid between *S. pruriens* var. *pruriens* and *S. galphimiifolius*

subsp. *rehmannii*. This supposition would be strengthened by the fact that both taxa cover about the same area (compare maps of the Tab. VI and VII).

var. **lanceolatus** Launert, var. nov.

Syn.: *Sphedamnocarpus wilmsii* Engler in Bot. Jahrb. **36**: 249 (1905); Arènes in Notul. Syst. **11**: 120 (1943); Burtt Davy, Man. Fl. Pl. & Ferns Transv. **2**: 284 (1932).

Typus: Transvaal, Distr. Lydenburg, beim grossen Wasserfall, *Wilms* 142 (B †; BM; K).

Sphedamnocarpus pruriens forma (II) *wilmsii* (Engler) Niedenzu in Verz. Vorl. Akad. Braunsb. S.-Sem. **1924**: 18 (1924); in Engler, Pflanzenr. IV, 141: 257 (1928). Typus as above.

Typus variet.: Southern Rhodesia; Matopos, fl. 14.xii.1912, *Rogers* 5651 (BM, holotypus; K; PRE; SRGH).

DISTR.: Southern Rhodesia, Northern Transvaal (see Tab. VI).

TRANSVAAL: Lydenburg, *Galpin* 12175 (PRE); *Jenkins* 10324 (PRE); *Wilms* 142 (B; BM; K); Pietersburg, *Gerstner* 5351a (SRGH); Hekpoort, *Cohen* 1103 (PRE); Rustplaats, *Taylor* s. n. (PRE).

SOUTHERN RHODESIA: Darwendale, *Eyles* 702 (BM; PRE; SRGH); Shamva, *Mainwaring* 2247 (PRE); Melsetter, *Williams* 82 (SRGH); Matopos, *Rogers* 5263 (K) & 5651 (BM; K; PRE; SRGH); *Galpin* 6951 (PRE); *Gourley* 121 (K; SRGH); *Greatrex* 14774 (K; SRGH); *West* 2164 (K; PRE; SRGH); *Exell, Mendonça & Wild* 1494 (BM; SRGH); *Miller* 1693 (SRGH); Bubi, *Keay* 21201 (K; SRGH); Besna Kobila, *Miller* 3460 (PRE); Que Que, *Mc Leod* 49 (K; PRE); Marandellas, *Dehn* 85 (BM; SRGH); Bulawayo, *Keay* 133 (FHO).

Note: This variety is characterised essentially by the shape of the leaf-lamina as expressed in the key and demonstrated in Tab. IV, 2. Arènes' key characters (comp. op. cit. pag. 106) «Sépales aigus au sommet. Limbe des pétales fimbrié inférieu-

rement, contracté en court onglet. Anthères ovales. Limbe foliaire oblong-lancéolé, aigu.» are within the range of variability of the whole species (it seems to me that he had not seen a single specimen). Burtt Davy (l. c.) keyed out *S. wilmsii* by its fimbriate petals; this cannot be confirmed, but on the other hand the occurrence of fimbriate petals is not unusual in this genus. Generally the flowers do not provide any character on which a classification can be based. I have notchosentheepithet *wilmsii* for the variety as I wish to base the latter on better type material.

4. **Sphedamnocarpus galphimiifolius** (A. Juss.) Szyszyl., Polypet. Discifl. Rehm.: **2** (1888) — Niedenzu in Arb. Bot. Inst. Akad. Braunsb. **6**: 49 (1915); in Verz. Vorl. Akad. Braunsb. S.-Sem. **1924**: 18 (1924); in Engler, Pflanzenr. IV, 141: 256 (1928) — Burtt Davy, Man. Fl. Pl. & Ferns Transv. **2**: 284 (1932) — Arènes in Notul. Syst. **11**: 118 (1943).

Typus: Mossambique, Delagoa Bay, *Forbes* (K).

Syn.: *Acridocarpus galphimiifolius* A. Juss. in Archiv. Mus. Par. **3**: 491 (1843).— Sonder in Harv. & Sonder, Fl. Cap. **1**: 232 (1860). Typus as above.

Acridocarpus pruriens var. *laevigatus* Sonder in Linnaea **23**: 22 (1850).

Typus variet.: Natal, *Gueinzius* 396 (K).

Sphedamnocarpus woodianus Arènes in Notul. Syst. **11**: 118 (1943).

Typus: Arènes has not designated a type; he cites: Zululand, *Gerrard* et *M'Ken* 1788; Natal, Nanoti, *J. Medley Wood* 8921. I have seen only the specimen *Gerrard* 1788 (K).

DISTR.: Natal, Transvaal, Mozambique, Southern Rhodesia (see Tab. VII).

S. galphimiifolius is a species with the leaves varying greatly in shape and size but with transitional forms linking all the extremes in such a way that it is very difficult to make infra-specific units. The only two distinct taxa I can recognise are the subspecies keyed out below. In the past some species

now included here were based on the position of the leaf-lamina (see Arènes op. cit. pag. 106 & Burtt Davy l. c.). More material available proves this to be a very untrustworthy character, as the glands sometimes occur near the apex of the petiole, or sometimes at the lower margin of the lamina. Glands may even be found in the same gathering in both of these positions, the position even being dependent on the state of development of the leaf itself.

S. woodianus was characterised by Arènes as follows, «Plante affine aux *S. galphimiifolius* et *S. pruriens* dont elle se distingue surtout par sa tendance très marquée à noircir à la dessiccation, par la brièveté des entrenoeuds rameaux, par la morphologie foliaire (forme, nervation, bords fortement révolutés), par la répartition de l'indument sur les feuilles adultes».

It seems that he based his species on a very stunted specimen and did not see any more material. The leaf-margin is usually revolute in dried material of *S. galphimiifolius;* the length of the internodes is variable in a way that it cannot be used at all for a classification. Moreover, the indumentum disappears on older leaves of nearly all specimens which I have studied.

The characters which were used to separate *S. rehmannii* from *S. galphimiifolius* are not important enough to maintain it as a distinct species. Besides the leaf-shape I could not find any other separating character, and as mentioned above there are many transitional forms which make it very difficult to distinguish between these taxa.

The only two subspecies which can be recognised may be keyed out as follows:

1) Leaf-lamina lanceolate or ovate-lanceolate, base cuneate rarely rounded; glands usually on the insertion of the petiole or on the lower margin of the lamina, rarely in the upper half of the petiole..... subsp. *galphimiifolius*

1) Leaf-lamina ovate, base subcordate or rounded; glands usually on the lower margin (usually near the insertion of the petiole)..... subsp. *rehmannii*

subsp. **galphimiifolius**

DISTR.: Natal, Swaziland, Transvaal, Mozambique, Southern Rhodesia (see Tab. VII).

Selected citation:

NATAL: Estcourt, *Codd* 2462 (PRE); Weenen, *Acocks* 10138 (PRE); Hlabisia, *Ward* 1845 (PRE); Nanoti, *Gerrard* 1788 (K).
SWAZILAND: Stegi, *Compton* 2662a (PRE).
TRANSVAAL: Waterval Boven, *Mason* 97 (K); Wylies Poort, *Gerstner* 5869 (PRE); Springfield, *Wood* 13069 (PRE).
MOZAMBIQUE: Delagoa Bay, *Forbes* s. n. (K); Namaacha, *Pedro & Pedrógão* 760 & 777 (LISC); *Gomes & Sousa* 431 (K); Goba, *Myre & Balsinhas* 648 (LISC).
SOUTHERN RHODESIA: Matobo, *Miller* 2665 (SRGH) & 2202 (K; SRGH) & 3461 (PRE) & 1491 (K; SRGH); *Hopkins* 7933 (BM); *Exell, Mendonça & Wild* 1495 (BM; SRGH); *Gibbs* 281 (K; BM); Bulawayo, *Chubb* 46 (BM; SRGH); Umtali, *Chase* 3617 (BM; SRGH); Victoria *Monro* 875 (BM).

subspec. **rehmannii** (Szyszyl.) Launert, stat. nov.

Syn.: *Sphedamnocarpus rehmannii* Szyszyl., Polypet. Discifl. Rehm.: 3 (1888). — Niedenzu in Engler, Pflanzenr. IV, 141: 257 (1928).— Burtt Davy, Man. Fl. Pl. & Ferns Transv. **2**: 284 (1932). — Arènes in Notul. Syst. **11**: 117 (1943).
Sphedamnocarpus rogersii Burtt Davy, op. cit. **1**: 50 (1926); op. cit. **2**: 284 (1932).— Arènes tom. cit. **11**: 118 (1943). Typus: Transvaal; Pietersburg Distr., Modjajes, *Rogers* 18041 (K).

Typus subspeciei: Transvaal, Houtbosh, *Rehmann* 6390 (BM; K).

DISTR.: (see Tab. VII).

TRANSVAAL (Selected citation): Lydenburg, *Galpin* 13282 (PRE); *Atherstone* xii.1873 (?) (K); Pilgrims Rest, *Galpin* 14406 (SRGH); *Smuts & Gillett* 2339 (PRE); *Rodin* 4065 (K); Soutpans-

berg, *Hutchinson* 1988 (K); *Codd* 8335 (K; SRGH) & 6911 — 3 miles N. E. of Sibasa — (K; SRGH); *Meeuse* 9754a (SRGH); Nelspruit, *Liebenberg* 2385 (K); *Story* 1879 (PRE); Houtbosh, *Rehmann* 6390 (BM; K); Modjadjes, *Rogers* 18041 (K); Pietersburg, *Codd* 8409 (K; SRGH); *Mogg* 429 (SRGH); *Meeuse* 9916 (PRE; SRGH).

5. **Sphedamnocarpus transvalicus** (Kuntze) Burtt Davy, Man. Fl. Pl. & Ferns Transv. **1**: 50 (1926); op. cit. **2**: 284 (1932). — Arènes in Notul. Syst. **11**: 118 (1943) in syn.

Typus: Transvaal, Pretoria, fl. 17.ii.1894, *O. Kuntze* s. n. (K).

Syn.: *Triaspis transvalica* Kuntze, Rev. Gen. Pl. **3**: 29 (1893). — Niedenzu in Engler, Pflanzenr. IV, 141: 256 (1928) in syn.

DISTR.: Transvaal and Bechuanaland (see Tab. VII).

Selected citation of material studied:

TRANSVAAL: Pretoria, *Acocks* 11301 (SRGH); *Meeuse* 9133 (K); *Dyer* in Nat. Herb. Pret. no. 28915 (K; PRE); *Repton* 256 (PRE); *Kuntze* 17.ii.1894 (K); Boshveld, Pinaarsriver, *Rehmann* 4790 (BM; K); Rustenburg, *Hutchinson* 2942 (BM; K); *Acocks* 18739 (K); *Nation* 100 (K); Magaliesberg, *Rand* 1264 (BM); Palalariver, *Breyer* 18047 (PRE). Waterberg, *Rogers* 24997 (K); Erasmus, *Repton* 1216 (PRE); Meintjes Kop, *Pole Evans* 358 (PRE); Naboomspruit, *Galpin* s. n. (PRE); Potchefstroom, *Louw* 1483 (K); Without precise locality, *Conrath* 64 (K); *Mogg* 14797 (K; PRE); *Nelson* 365 (K); *Schlechter* 4079 (BM; K).

BECHUANALAND: Kanye, *Miller* B/455 (PRE) & B/978 (K; PRE).

Note: In spite of the treatment of *S. transvalicus* by Niedenzu (l. c.) and Arènes (l. c.) there is no doubt that our taxon has to be regarded as a distinct species closely related to *S. galphimiifolius*. It always has a distinct shrubby habit as expressed out in the key. The main differences are as follows:

transvalicus	*galphimiifolius*
Leaf-lamina 1.2-3 × 0.5-1.5 cm, usually with the apex subobtuse or sometimes acute.	Leaf-lamina 2-6.5 × 0.7-3.5 cm, with the apex always acute.
Petioles 0 2-0.7 cm long.	Petioles 0.5-1.7 cm long.
Wing of the samara broadly ovate, extending to the base of the nut.	Wing of the samara oblong or oblong-obovate, not extending to the base of the nut (or only as a small rim).

IV. NOTES ON *CAUCANTHUS* FORSK. AND ITS DISTRIBUTION

1. **Caucanthus edulis** Forsk., Fl. Aegypt.-Arab.: CXI, 91 (1775).

Syn. nov.: *Tristellateia somalensis* Chiov., Result. Sc. Miss. Stephani Paoli Somal. Ital. **1**: 37 (1916).— Niedenzu in Engler, Pflanzenr. IV, 141: 66 (1928).

Typus: Somaliland, Bosaglia presso Mogadiscio, *Paoli & Stephanini* 82 (FI).

N. B.: *Chiovenda* based this species on a sterile specimen. The plant is without any doubt *C. edulis*.

Tristellateia africana var. *somaliensis* (Chiov.) Arènes in Mém. Mus. Nation. Hist. Nat. Par. n. sér. **21**: 312 (1947).— Cufod. in Bull. Jard. Bot. Bruxelles, **26**, Suppl.: 404 (1956).

Typus variet. as for the spec. above.

The complete synonymy is given by Niedenzu (1928).

2. **Caucanthus albidus** (Niedenzu) Niedenzu in Engler, Pflanzenr. IV, 141: 36 (1928).

Syn. nov.: *Caucanthus argenteus* Chiovenda, Fl. Somala **2**: 41 (1932) non Niedenzu (1904).

Typus: Somaliland; Isna (?) di Osbsada, fl. 21. vii.1929, *Senni* 341 (FI).

Diaspis scandens Chiov. in schedul.

Note: In designating his types Chiovenda has caused some confusion.
In Herbarium FI there are two gatherings seen by him:

a) *Senni* 805, labelled as *Diaspis scandens* as well as *Caucanthus argenteus* and provided with a type-label.
b) *Senni* 341 with the original label *Diaspis scandens* Chiov. and an attached label *Caucanthus argenteus* Chiov., spec. nov.; this sheet is also provided with a type-label.

Caucanthus chiovendae Cufod. in Bull. Jard. Bot. Bruxelles, **26**, Suppl.: 403 (1956).
Typus as for *C. argenteus* Chiov.

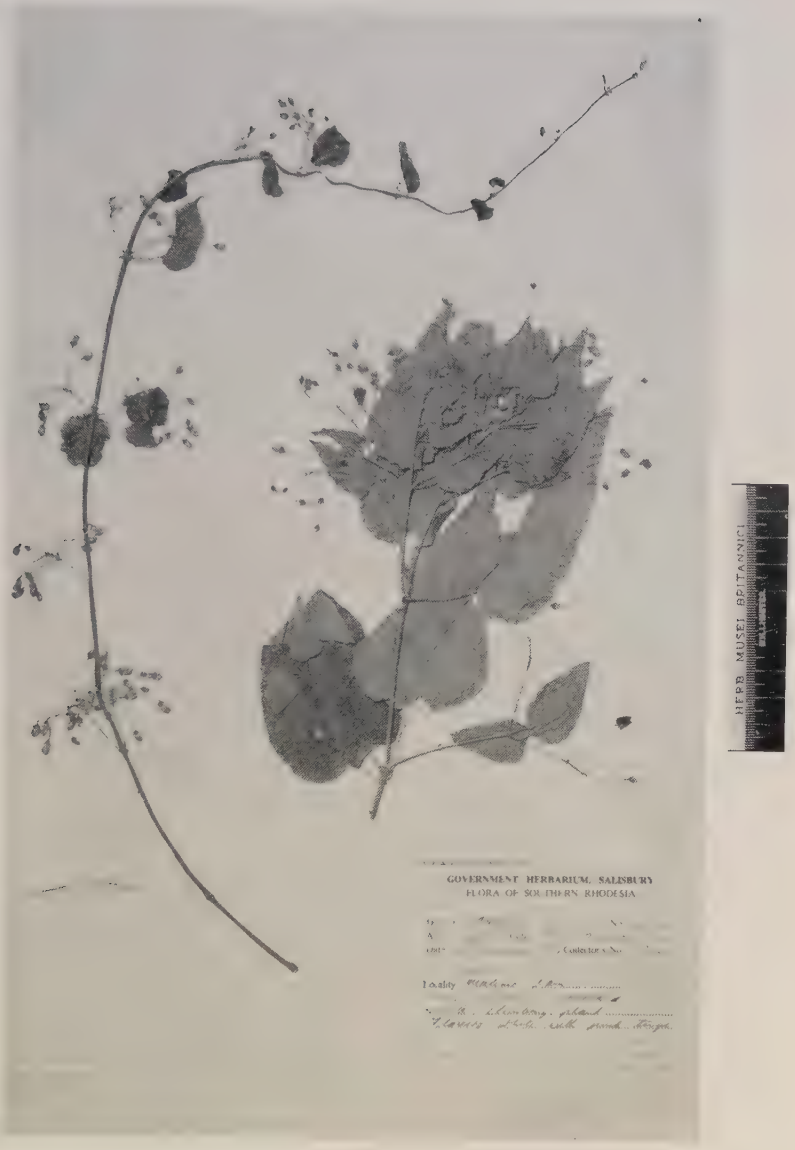
Full synonymy and descriptions will appear in my treatment of *Malphighiaceae* in Fl. Trop. East Afr. which is now in course of preparation.

3. **Caucanthus auriculatus** (Radlk.) Niedenzu in Arb. Bot. Inst. Akad. Braunsb. **6**: 18 (1915); in Verz. Vorl. Akad. Braunsb. S.-Sem. **1924**: 2 (1924).

Syn. nov. (?): *Caucanthus cinereus* Niedenzu in Bull. Herb. Boiss. sér. 2, **4**: 1011 (1904).
Typus: «British Ostafrika», *Alfred Kaiser* (B †).

Unfortunately the type specimen of *C. cinereus* was destroyed by war action in Berlin. The differentiating characters given by Niedenzu (in Engler, Pflanzer. IV, 141: 34 (1928) can sometimes be found in a single specimen of *C. auriculatus*. Due to its wide distribution and its climbing habit *C. auriculatus* shows a great amount of variation, but in such a way that the morphological extremes occur simultaneously in specimens from the extreme North-South extensions of the great area covered by the species (see Tab. V).

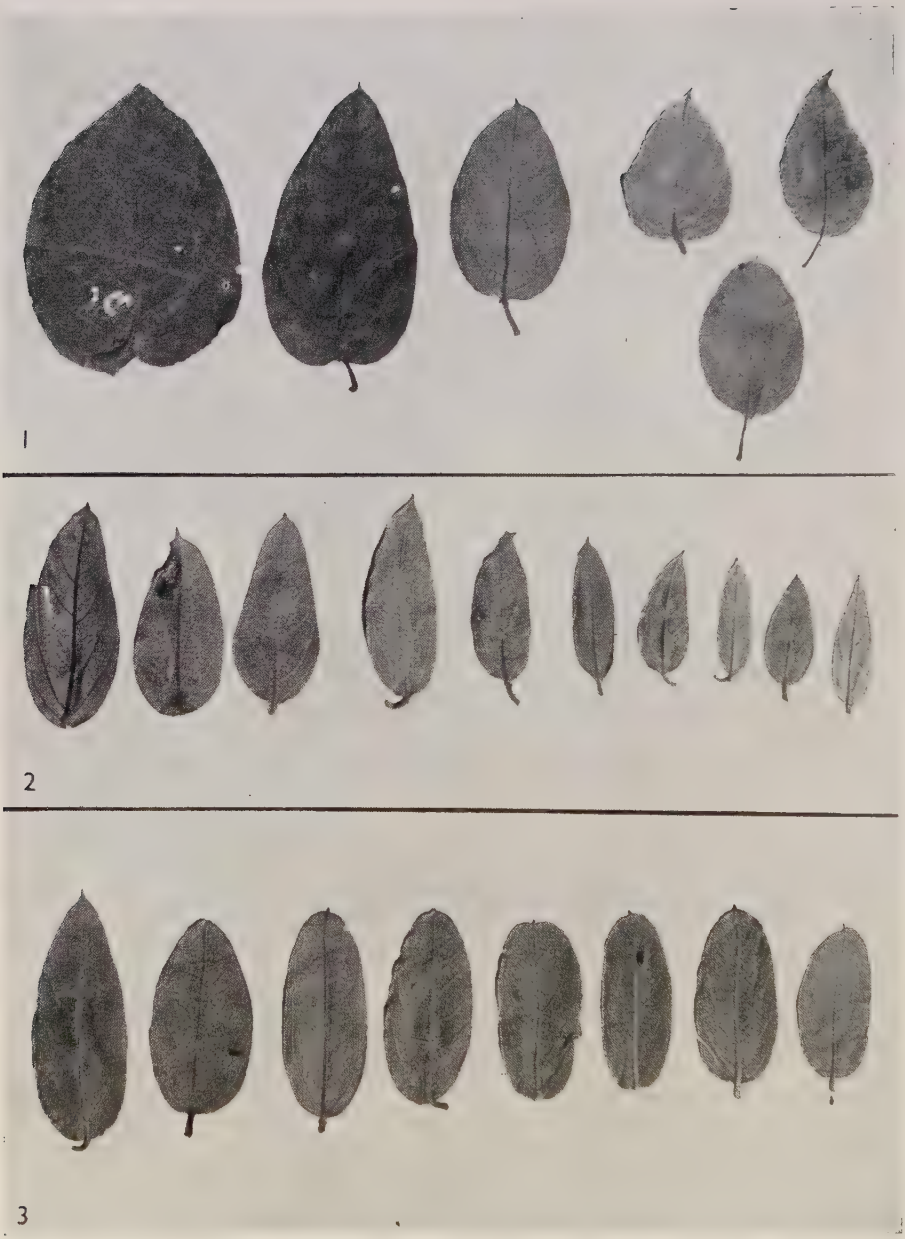
The genus *Caucanthus* is thus represented by three well-defined species. The centre of its distribution lies in N.E. Tropical Africa (see Tab. V); only one species extends southwards. The area of distribution of *C. auriculatus* shows a remarkable gap which isolates the localities in Mozambique from the East African ones. It is interesting to note that this gap similarly occurs for two other species of African *Malphighiaceae: Tristellateia africana* S. Moore, as shown in Tab. VII, and *Triaspis mozambica* A. Juss., a species which will be discussed in a later paper.



Photograph of *Triaspis dumeticola* Launert

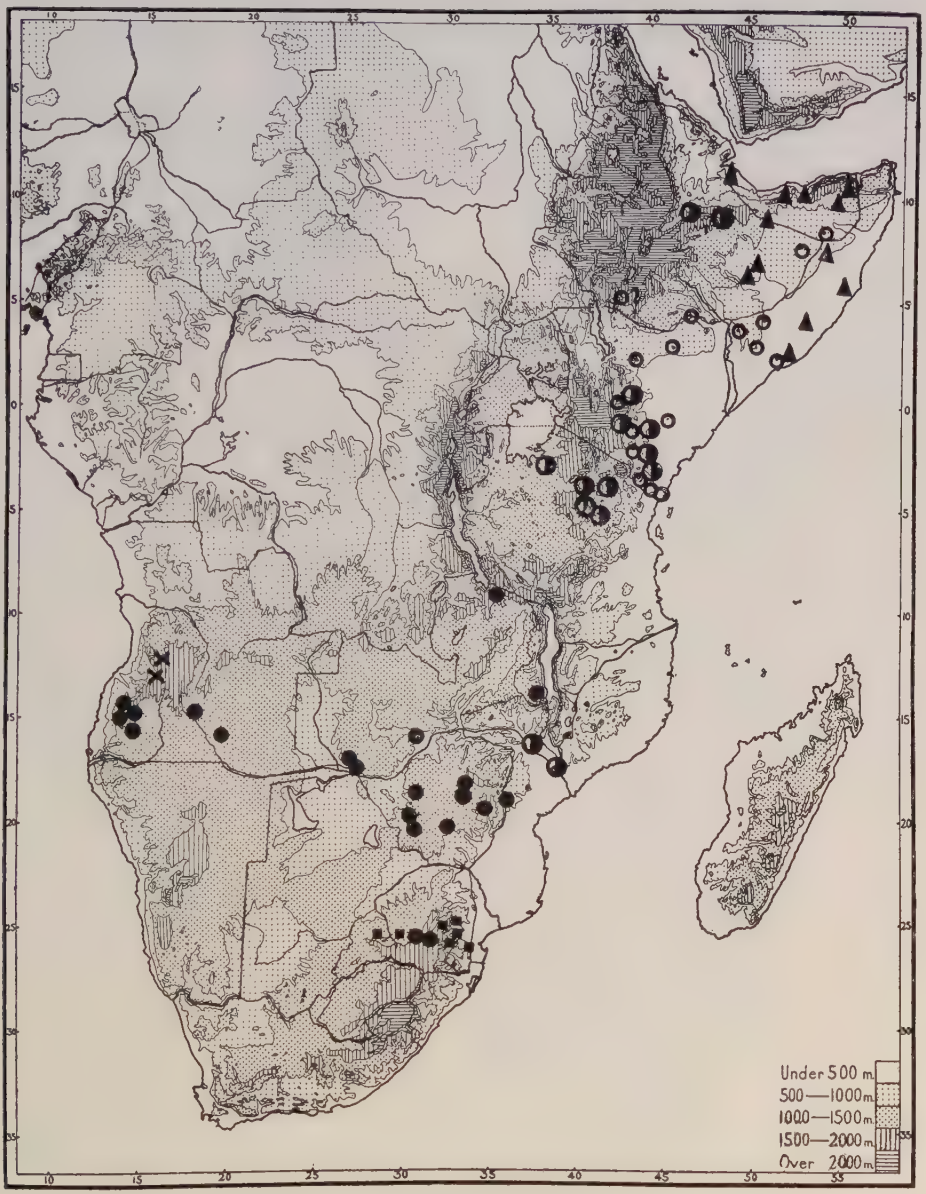
Photograph of *Acridocarpus natalitius* var. *linearifolius* Launert

Photograph showing the leaf-variation in *Sphedamnocarpus pruriens* (A. Juss.) Szyszyl.
var. *pruriens*



Photograph showing the leaf-variation in

1) *Sphedamnocarpus pruriens*
var. *latifolius* Engler
2) *Sphedamnocarpus pruriens*
var. *lanceolatus* Launert
3) *Sphedamnocarpus angolensis* (A. Juss.) Planch.



Map showing distribution of

- ■ *Sphedamnocarpus pruriens* var. *latifolius* Engler
- ● *Sphedamnocarpus angolensis* (A. Juss.) Planch.
- ✕ *Sphedamnocarpus barbosae* Launert
- ○ *Caucanthus albidu* Niedenzu
- ▲ *Caucanthus edulis* Forsk.
- ◑ *Caucanthus auriculatus* (Raldk.) Niedenzu

Map showing distribution of

- ● *Sphedamnocarpus pruriens* (A. Juss.) Szyszyl. var. *pruriens*
- ○ *Sphedamnocarpus pruriens* (A. Juss.) Szyszyl. var. *lanceolatus* Launert

Map showing distribution of

- ■ *Sphedamnocarpus transvalicus* (Kuntze) Burtt Davy
  Sphedamnocarpus galphimiifolius (A. Juss.) Szyszyl.
- ● subsp. *galphimiifolius*
- ○ subsp. *rehmannii* (Szyszyl.) Launert
- ▲ *Tristellateia africana* S. Moore

ADDITIONES ET ADNOTATIONES FLORAE ANGOLENSI — III

AUCTORE

E. J. MENDES

Centri Botanicae
Junctae Investigationum Ultramaris

EM herborizações que tive oportunidade de realizar em Angola, durante as campanhas da Missão Botânica de Angola e Moçambique de 1955-56 e de 1959-60, colhi materiais que, na altura, admiti corresponderem a um taxon inédito para aquela província. Esta ideia foi confirmada posteriormente, ao determinar os referidos materiais como *Moringa ovalifolia* Dinter & Berger.

Tanto quanto me foi dado averiguar, apenas Gossweiler (*in Agron. Angol.* **2**: 229 et 235, 1949 *et Fl. Exot. Ang.:* 139 et 144, 1950) e Exell & Mendonça (*Consp. Fl. Ang.* **2**: 134, 1954) referem, para Angola, materiais pertencentes à família *Moringaceae.*

Na realidade, Gossweiler *(locis cit.)* dá notícia de ser cultivada e de ocorrer subespontânea no litoral de Luanda *M. oleifera* Lam. *(M. pterygosperma Gaertn.)*, o que confirmo com os espécimes *Mendes* 4046 (COI; LISC; LUAI) colhidos em 18-V-1960 nas barrocas de Luanda. Por seu lado, Exell & Mendonça *(l. c.)* não só citam Gossweiler (*Fl. Exot. Ang.:* 139, 1950), como mencionam o espécime *Gossweiler* 10955 (BM) que identificaram com *M. oleifera.* A meu ver, porém, aquele espécime é, também, *M. ovalifolia.*

As duas espécies mencionadas apresentam em Angola, entre outras, as seguintes características diferenciais:

M. oleifera	*M. ovalifolia*
Flores acentuadamente zigomórficas	Flores aparentemente actinomórficas
Segmentos do cálice de 2.5-3 × × 10-13 mm, retroflectidos na ântese, cálice externamente densamente pubérulo	Segmentos do cálice de 1.5-2 × × 5-6 mm, não retroflectidos na ântese, cálice glabrescente
Pétalas 4, recurvadas, de 3.5-4 × × 15-16 mm, mais 1, recta, de 4-5 × 18-20 mm	Pétalas 5, subiguais, de 2.5-3 × × 8-9 mm
Estames e estaminódios peludos no terço inferior	Estames e estaminódios glabros
Folíolos elípticos ou ovados ou obovados, obtusos ou emarginados no ápice, não excedendo 15 × 25 mm	Folíolos ovados ou lanceolados, de ápice agudo mucronulado, de base acentuadamente assimétrica (à excepção dos terminais), atingindo 30 × 55 mm
Nervuras secundárias invisíveis na página superior	Nervuras secundárias nítidas nas duas páginas
Bases dos folíolos de um mesmo par não distando mais de 6 mm	Bases dos folíolos de um mesmo par distando (10-) 20-40 mm

Nestas circunstâncias, parece-me oportuno comunicar os dados conhecidos em relação à espécie agora referida para Angola pela primeira vez:

Moringa ovalifolia Dinter & Berger in Dinter, Neue wen. bek. Pflanz. Deuts.-Südw.-Afr.: 45 (1914) — (Tab. I et II).

M. oleifera sensu Exell & Mendonça, Consp. Fl. Ang. **2**: 134 (1954), pro parte quoad spec. Gossw. 10955.

MOÇÂMEDES: Moçâmedes, ao km 75 do C. F., alt. 580 m, V-1937, *Gossweiler* 10955 (BM); Moçâmedes, andados ca. 30 km de Cambongue para a serra da Huapa, *c. fl.* 13-IX-1955, *Mendes* 67 (LISC); Moçâmedes, Dois Irmãos, *c. fl.* 18-IX-1955, *Mendes* 118 (LISC); Moçâmedes, andados 17 km de Lucipa para S. Nicolau, *c. fr. imat.* 5-I-1956, *Mendes* 1206 (LISC); Porto Alexandre,

entre a garganta do Dr. Mota e Espinheira, damba de Onguto, *c. fl. et fr.* 12-I-1956, *Mendes* 1273 (COI; K; LISC; LUAI; SRGH); Moçâmedes, Dois Irmãos, *c. fr.* 30-IV-1960, *Mendes* 3891 (BR; K; LISC); Moçâmedes, Dois Irmãos, *c. fr.* 4-V-1960, *Mendes* 3938 (COI; K; LISC; LUAI; SRGH); Porto Alexandre, próx. da damba da Cariata, *c. fl. et fr. imat.* 7-IX-1955, *Mendonça* 4664 (LISC); Moçâmedes, Virei, *c. fl.* 12-IX-1955, *Mendonça* 4688 (COI; BR; LISC; LUAI; SRGH); Moçâmedes, Dois Irmãos, *c. fr. imat.* 21-XII-1955, *Torre* 8241 (LISC).

DISTRIBUIÇÃO GEOGRÁFICA: Angola (distrito de Moçâmedes) e Sudoeste Africano até cerca do paralelo 24° S segundo Gillett *(in litt.)*.

HÁBITO E ECOLOGIA: pequena árvore ou arbusto da estepe de árvores e arbustos da zona dos *inselbergen* da peneplanície subdesértica do Namib (Tab. I et II).

* * *

Por admitir que as sementes de *M. ovalifolia* pudessem conter óleo com propriedades idênticas às do óleo de Ben *(M. oleifera)*, colhi cerca de quinhentos gramas de sementes frescas do exemplar *Mendes* 3938 que entreguei, para análise, ao Ex.mo Sr. Prof. Dr. Albano Pereira Jr., do Agrupamento Científico de Farmacognosia para o estudo de Plantas Medicinais do Ultramar (Núcleo da Escola de Farmácia de Lisboa), que muito amàvelmente se prontificou a realizar os estudos necessários.

Moringa ovalifolia Dinter & Berger. Exemplar *Mendes* 1273, na damba de Onguto, entre garganta do Dr. Mota e Espinheira (circ. de Porto Alexandre, distr. de Moçâmedes), 12-I-1956. *(Foto do A.)*

Moringa ovalifolia Dinter & Berger. Exemplar *Mendes* 3938, desenvolvido sobre um *inselberg*, em Dois Irmãos (circ. de Moçâmedes), 4-V-1960. *(Foto do A.)*

A NEW ORCHID FROM MADEIRA

by

V. S. SUMMERHAYES

Royal Botanic Gardens, Kew

In October 1959 we received at Kew, through the good offices of Major C. H. C. Pickering, a specimen of an orchid collected by Mr G. C. Maul, Curator of the Municipal Museum at Funchal, Madeira, on the Pico do Cidrão in that island. This plant was clearly distinct from any species recorded from Madeira, resembling both *Orchis mascula* L. and *O. patens* Desf., but differing from both species in the non-spreading perianth segments and short slender spur.

We asked for further material and as a result received from Mr Maul in September 1960 dried and spirit material of the species together with a series of photographs showing the habitat of the plants. From an examination of these excellent specimens there seems no doubt that we have here a distinct species, allied to the above mentioned two species, but sufficiently distinct to warrant recognition. I should like here to express my thanks to Mr Maul for the opportunity of examining such complete material of this very interesting plant. A formal description follows.

Orchis (sect. **Androrchis**) **scopulorum** Summerhayes, sp. nov.; affinis *O. masculae* L. et *O. patenti* Desf., ab illa calcari dependente brevi, sepalis nec patentibus nec reflexis, ab hac bracteis fere membranaceis 1-3-nervis, calcari anguste cylindrico versus apicem leviter inflato satis distinguitur.

Herba terrestris, erecta, usque 55 cm. alta, radicibus exceptis fere omnino glabra; tubera ovoidea vel ellipsoidea, 2-4 cm. longa, 1-2 cm. diametro, ut radices dense tomentosa; radices e

basi caulis exorientes, graciles, flexuosae. *Caulis* simplex, per totam longitudinem foliatus, in inflorescentiam terminans, ± teres, basi usque 12 mm. diametro. *Folia* 8-11, immaculata; 2-3 infima ad vaginas redacta, membranacea, apice apiculata; 3-5 intermedia versus caulis basin aggregata, suberecta, ± patentia vel leviter recurvata, anguste vel elliptico-oblonga, utroque angustata, apice obtusa, 9-16 cm. longa, 1.5-3 cm. lata, costa subtus prominula, supra leviter canaliculata, subcarnosa; 2-3 superiora erecta, caulis adpressa et eundem ± circumdantia, usque 17 cm. longa, apice acuta. *Inflorescentia* simpliciter racemosa, usque 10 cm. longa, 4-5 cm. diametro, sublaxe 8-18-flora; rhachis ± teres, sursum sensim angustata; bracteae fere membranaceae, anguste lanceolatae, acutissimae, usque 2.5 cm. longae, pedicellum cum ovario aequantes vel paulo superantes, purpureo-tinctae, 1-3-nerviae. *Flores* erecto-patentes, lilacino-purpurei; pedicellus cum ovario 1.5-2 cm. longus. *Sepala* vix patentia; intermedium ellipticum, obtusum, 8-10 mm. longum, 4-5 mm. latum, leviter convexum; lateralia oblique semi-ovata, apiculata vel obtusa, prope apicem leviter dorsaliter carinata, 10-13 mm. longa, circiter 4 mm. lata; omnia sepala 3-5-nervia. *Petala* oblique lanceolata, acuta, circiter 10 mm. longa, 3-4 mm. lata, marginibus papillosis, uninervia. *Labellum* porrectum, e basi rotundata ambitu late quadrato-ellipticum vel suborbiculare, supra medium distincte trilobatum, 14-17 mm. longum, 13-16 mm. latum; lobus intermedius latior quam longus, transverse ellipticus vel oblongus, valde emarginatus vel fere bilobulatus apiculo interjecto, lobulis rotundatis ± grosse dentatis, totus 5-6 mm. longus, 9-13 mm. latus; lobi laterales ab intermedio sinibus angustis sejuncti, rotundato-triangulares, grosse dentati, quam intermedius duplo breviores; discus farinaceo-puberulus multinervis; calcar dependens, ovario parallele, anguste cylindricum, prope apicem leviter inflatum, apice ipso rotundatum, 6-8 mm. longum, 1-1.5 mm. diametro. *Columna* leviter incurvata, 3-4 mm. alta, apice apiculata, basi utrinque alata cum basi labelli adnata; antherae loculi paralleles; bursicula semi-orbicularis; ovarium tortum, leviter 6-sulcatum.

Madeira. Pedra Rija, Pico do Cidrão, 1750 m. alt., June 1960, *G. C. Maul* (dried and in liquid preservative).

The plants were growing on steep cliff faces of rock or of volcanic ash and fragments of basalt, together with *Saxifraga maderensis*, *Armeria maderensis* and *Aeonium glandulosum*, at Pedra Rija and between Passadas and the top of Pico Arieiro.

As regards the affinity of the species it appears to be intermediate in characters between *O. mascula* L. and *O. patens* Desf. The latter is widely spread throughout the Mediterranean region with an isolated subspecies in the Canary Islands. It has, however, a much thicker more or less conical spur, while the bracts are more foliaceous in texture and only 1-nerved. *O. mascula*, on the other hand, though possessing membranous 1-3-nerved bracts, as in the present species, has a much longer horizontally placed or upcurved spur. In general vegetative characters the present species resembles large specimens of both species, but the leaves are not spotted. As already mentioned, *O. scopulorum* differs from both species in its more or less connivent sepals, these being spreading or even reflexed in *O. mascula* and in the great majority of forms of *O. patens*. It seems possible that *O. scopulorum* may be yet another example of the relict species characteristic of the islands of the Atlantic Ocean.

NOTES ON *GERANIUM* IN AFRICA AND ARABIA

by

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LITTLE taxonomic work has been carried out on the genus *Geranium* in Africa and Arabia since R. KNUTH published his monograph of the family *Geraniaceae* (KNUTH, 1912). To-day considerably more material of the genus is available for study from Africa than was available to KNUTH and this has revealed that a number of alterations are necessary in the status, nomenclature, etc. of the taxa recognised by KNUTH. The species of *Geranium* in tropical Africa are of particular interest in view of the fact that they are confined to mountain summits and high plateaux. Therefore many species have a disjunct distribution and some of them have undergone differentiation presumably due to isolation. Thus the genus presents a number of interesting phytogeographical, as well as taxonomic, problems.

An exclamation mark (!) indicates that the specimen has been examined by the writer.

Geranium arabicum Forsk., Fl. Aegypt.-Arab.: 124 (1775) — Christensen in Dansk Bot. Ark. **4** (3): 23 (1922). Type: Arabia, Yemen, Kurma, *Forskål* (735 in Herb.) (C!, lectotype; BM!, photograph).

Geranium compar R. Br. in Salt, Voy. Abyss., app.: 65 (1814), *nom. nud.* — Steud., Nom. Bot., ed. 2, **1**: 678 (1840), *nom. nud.* (as *G. impar*). (Ethiopia, *Salt* s.n., BM!).

Geranium simense Hochst. ex A. Rich., Tent. Fl. Abyss. **1**: 116 (1847). — Oliv., Fl. Trop. Afr. **1**: 291 (1868). — Schwein. in Bull. Herb. Boissier **7**, app. 2: 267 (1899).

— R. Knuth in Engl., Pflanzenr. IV, 129: 203, t. 26 fig. A-B (1912). — Blatter in Rec. Bot. Surv. India **8**: 102 (1919).— Schwartz in Mitt. Inst. Allg. Bot. Hamb. **10**: 117 (1939). — Milne-Redh. in Keay, Fl. West Trop. Afr., ed. 2, **1**(1): 157 (1954). — Cufodontis in Bull. Jard. Bot. État Brux. **26**, suppl.: 347 (1956). — Hedberg in Symb. Bot. Upsal. **15** (1): 125 & 293 (1957).— E. Petit in Fl. Congo Belge & Ruanda-Urundi **7**: 24 (1958). Type: Ethiopia, Simien, Mt. Selki, *Schimper* II 670 (BM!, K!, S, isotypes).

Geranium frigidum Hochst. ex A. Rich., Tent. Fl. Abyss. **1**: 116 (1847) *nom. syn.* — Briq. in Ann. Cons. Jard. Bot. Genève **11** & **12**: 184 (1908).— R. Knuth in Engl., Pflanzenr. IV, 129: 205 (1912). Type: Ethiopia, Aduwa, M. Kubbi, *Schimper* II 1061 (BM!, K!, isotypes).

Geranium emirnense Hils. & Boj. ex Hook. in Journ. Linn. Soc. **7**: 185 (1864), *nom. nud.* (Fernando Po, *Mann* 619, K!).

Geranium simense var. *glabrius* Oliv., Fl. Trop. Afr. **1**: 291 (1868). — R. Knuth in Engl., Pflanzenr. IV, 129: 205 (1912). Syntypes: Cameroons, *Mann* 1323 (K!, syntype) & 1966 (K!, syntype).

Geranium simense var. *repens* Oliv., Fl. Trop. Afr. **1**: 291 (1868). — R. Knuth in Engl., Pflanzenr. IV, 129: 205 (1912). Type: Fernando Po, *Mann* 619 (K!, holotype).

? *Geranium simense* var. *meyeri* Engl. in Phys. Abh. Akad. Wiss. Berl. **1891**, 2: 274 (1892). Type: Tanganyika, Kilimanjaro, *Meyer* 15 (B, destroyed).

Geranium simense forma *aprica* Engl. in Phys. Abh. Akad. Wiss. Berl. **1891**, 2: 274 (1892). Syntypes: Ethiopia, *Schimper* 734 (BM!, K!, syntype collections), II 1378, *Steudner* 980; Tanganyika, Kilimanjaro, *v. Höhnel* 134 (149); Fernando Po, *Mann* 619 (K!, syntype collection).

Geranium simense forma *umbrosa* Engl. in Phys. Abh. Akad. Wiss. Berl. **1891**, 2: 274 (1892). Syntypes: Ethiopia, *Schimper* 346, 736 (BM!, K!, syntype collections), II 670 (BM!, K!, syntype collections), II 1061 (K!, syntype collection); *Steudner* 973, 974, 982, 983;

Tanganyika, Kilimanjaro, *Meyer* 18; Cameroons, *Mann* 1966 (K!, syntype collection).

Geranium keniense Standl. in Smithsonian Misc. Coll. **68** (5): 7 (1917). Type: Kenya, Mt. Kenya, *Mearns* 1513 (BM!, isotype).

Geranium arabicum extends from Yemen, Eritrea, Sudan and Ethiopia through the mountains of East Africa to Southern Rhodesia. It occurs also in the highlands in West Africa (Nigeria, Cameroons, Fernando Po) and in Malagasey (Madagascar).

Forskål (1775, p. 124) describes *Geranium arabicum* as follows: «82. GERANIUM ARABICUM; *staminibus* 10, *fertilibus; pedunculis binis; foliis rotundis, incisis.* In *Yemen* frequens. Arab. *Talab* vel *Chåda.* Alüs *Ghasl. Variat:* α) *Flore albo.* β) *Flore rubro, basi fuscescente. Usus medicus:* in Cephalalgia lavatur caput Geranio in aqua cocto».

By courtesy of the Director, Botanical Museum and Herbarium, Copenhagen, Forskål's material of *Geranium arabicum* was sent on loan to the British Museum (Natural History), London, for examination. The material consisted of two sheets, one of which, Herb. Forsk. 735 (see Plate I), is identical with the species known as *G. simense* Hochst. ex A. Rich., whilst the other, Herb. Forsk. 736, is *G. ocellatum* Jacquem. ex Cambess. The latter specimen has fruiting carpels with shallow reticulate ridges, the chief character which separates *G. ocellatum* from the other members of the taxonomically difficult group to which *G. ocellatum* belongs. Specimens of both *G. simense* and *G. ocellatum* have been collected in the Yemen since Forskål's visit.

Since Forskål (1755, p. CXVI & 124) gives only three taxa of *Geranium*, as the genus is now understood, as having been met with in Arabia, it is evident that sheets 735 and 736 refer to the two varieties of *G. arabicum* which Forskål describes. The third *Geranium* mentioned is *G. robertianum* which has a very different leaf from the specimens on sheets 735 and 736, so that neither sheet can refer to this record.

The species known as *Geranium simense* has petals which are white or pink (rarely pale purple) with red veins, whilst the petals of *G. ocellatum* are purple-pink with a distinct dark purple centre. It is therefore evident that «Variat: α) Flore

albo» is the specimen on sheet 735 and is the species which has long been known as *G. simense*, whilst «Variat: β) Flore rubro, basi fuscescente» is the specimen on sheet 736 and is *G. ocellatum*. The dark centre to the petals is clearly visible in Forskål's specimen.

Christensen (1922, p. 3) writes «The plants from Yemen are, on the other hand, very often provided with a small original label, upon which Forsskål has written the name of the plant and the locality». On the back of sheet 735 there is such a small label which reads: «Geran. pedunc. 2 fl. fl. albo. Ghasl Kurma». This label confirms that the specimen on this sheet is the «Variat: α) Flore albo». Unfortunately there is no original label on sheet 736.

Sheet 735, that is the «Variat: α) Flore albo», is selected to be the lectotype of *Geranium arabicum* Forsk. Thus the name *G. simense* goes into synonymy, as given above.

Specimens intermediate between *Geranium arabicum* and *G. kilimandscharicum* Engl. are not uncommon. The latter is retained as a species by Hedberg (1957, p. 124, p. 293); it is confined to altitudes exceeding 3200 m. on Mt. Elgon, the Aberdares, Mt. Kenya and Kilimanjaro. Cultivation of *G. kilimandscharicum* may well reveal that it is only a montane form or, at best, a subspecies of *G. arabicum*, and does not deserve specific status.

Geranium exellii Laundon **sp. nov.**

Herba perennis prostrata. *Caules* longitudinaliter sulcati pilosi pilibus patentibus glandulosis. *Folia* caulina, stipulis 4-5 mm. longis fere ad basin laciniatis, segmentis linearilanceolatis ± pilosis; petiolo 0.5-8 cm. longo longitudinaliter sulcato piloso-glanduloso; lamina ad. c. 4/5 5-loba, lobis basi 2-6 mm. latis, ambitu ellipticis, pinnatilobatis, supra infraque pilosa. *Flores* in inflorescentias (1-) 2-floras pedunculatas pedunculo 1-9 cm. longo piloso-glanduloso, dispositi, pedicellis 1-4 cm. longis glanduloso-pilosis; bracteae 3-4 mm. longae angustissime lanceolatae pilosae. *Sepala* 5-6 × 2-2.5 mm. elliptico-lanceolata apice cuspidata (cuspide 1 mm. longo), 3-nervia, glandulosa.

Petala c. 8-9 × 4 mm. obovata, alba vel albida venis roseis lineata. *Stamina* 10, filamentis 5 mm. longis, anguste lanceolatis. *Ovarium* pubescens, stigmata 5. *Fructus* carpella laeves pilosa; columna stylaris 14-16 × 1 mm. glandulosa; stigmata 2 mm. longa. *Semina* glabra; testa vix profunde reticulata.

S. RHODESIA: Untali District, Engwa, 1980 m., fl. 2.II.1955, *Exell, Mendonça & Wild* 109 (BM!, holotype; LISC!, isotype; SRGH!, isotype); Himalayas, Engwa, 2130 m., fl. & fr. 2.II.1954, *Wild* 4462 (K!, SRGH!).

MOZAMBIQUE: Manica e Sofala, Tsetsera, 1980-2140 m., fl. & fr. 10.II.1955, *Exell, Mendonça & Wild* 337 (BM!, LISC!, SRGH!).

Endemic to the mountains on the borders of Southern Rhodesia and Mozambique. Grassland at 1980-2140 m.

Geranium exellii is related to the South African species *G. ornithopodum* Eckl. & Zeyh. and *G. schlechteri* R. Knuth. It differs from both of these in the shape of its leaves (see Plate II). The lobes of the leaves of both *G. ornithopodum* and *G. schlechteri* are pinnatifid, whilst the lobes of *G. exellii* are pinnatilobed. Indeed, the leaves of *G. exellii* are unlike any previously described species of *Geranium* occurring on the African continent. Divided stipules, coarse hairs (chiefly on the veins) on the undersurface of the leaves and smooth and hirsute fruiting carpels are other important characters of the new species.

Geranium incanum subsp. **nyassense** (R. Knuth) Laundon, **stat. nov.**

Geranium nyassense R. Knuth in Fedde, Repert Sp. Nov. **18**: 289 (1922).—Milne-Redh. in Mem. N. Y. Bot. Gard. **8**: 231 (1953). Type: Tanganyika, Kyimbila, 1800 m., *Stolz* 1389 (B, holotype (destroyed); K!, isotype).

Geranium ukingense R. Knuth in Fedde, Repert Sp. Nov. **18**: 292 (1922). Type: Tanganyika, Kyimbila, Ukingaberge, 2400 m., *Stolz* 2060 (B, holotype (destroyed); BM!, isotype).

Material of this subspecies is very abundant; therefore the following is only a representative selection:

TANGANYIKA: Southern Highlands Province: Mt. Rungwe, above Mwakaleli, 2290 m., fl. & fr. V. 1953, *Eggeling* 6552 (EA!; K!); Msima Stock Farm, Iringa District, fl. & fr. 1932, *Emson* 280 (EA!; K!); W. Mporotos-Rungwe, 1830 m., fl. & fr. 13.VIII.1933, *Greenway* 3550 (EA!; K!); Mbeya Mts., 2440 m., fl. & fr. V. 1938, *MacInnes* 334 (BM!); Mufindi West, Iringa District, fl. & fr. 31.I.1934, *Michelmore* 940 (EA!; K!); 11 km. S. of Njombe, 1770 m., fl. & fr. 8.VII.1956, *Milne-Redhead & P. Taylor* 10787 (K!); Ngozi Poroto Mts., Rungwe District, 2100 m., fl. & fr. 17.X.1956, *Richards* 6552 (K!); Ndumbi forest reserve, fl. & fr. III.1954, *Semsei* 1645 (EA!; K!). Ukingaberg, Kyimbila District, 16-1800 m., fl. 1913, *Stolz* 2060 (BM!, isotype of *G. ukingense* R. Knuth); Lower Plateau, north of Lake Nyassa, fl. & fr. X.1880, *Thomson* s. n. (K!).

TANGANYIKA: Southern Province: Songea District: Matengo Hills, c. 1 km. N. W. of Miyau, 1590 m., fl. & fr. 28.V.1956, *Milne-Redhead & P. Taylor* 10471 (K!); Matengo, 1400 m., fl. 20.XI.1936, *Zimmer* 165 (BM!).

NYASALAND: Northern Province: Nyika Plateau, North Nyasa District, 2340 m., fl. 12.VIII.1946, *Brass* 17189 (BM!; K!; SRGH!); Nyika Plateau, Nacheri, 2290 m., fl. & fr. IX.1902, *McClounie* 164 (K!); Nyika Plateau, Lake Kaulime, 2200 m., fr. 23.X.1958, *Robson & Angus* 274 (K!).

MOZAMBIQUE: Manica e Sofala: Tsetsera, 2140 m., fl. & fr. 7.II.1955, *Exell, Mendonça & Wild* 248 (BM!; COI!; LISC!; SRGH!); Serra da Gorongosa, near Pico Gogôgo, 1700 m., fl. & fr. 26.IX.1943, *Torre* 5948 (LISC!).

SOUTHERN RHODESIA: Eastern Highlands: road to M'tarazi Falls, Inyanga District fl. & fr. 1.IV.1949, *Chase* 1284 (BM!; SRGH!); Nyangani, Inyanga District, fl. & fr. 26.XI.1949, *Chase* 1831 (BM!; SRGH!); World's View, Inyanga District, 1830-2130 m., fl. IX.1956, *Davies* 2127 (K!; SRGH!); below «Elephant Forest» Vumba Mts., Umtali District, 1650 m., fl. 13.XII.1955, *Drummond* 5093 (BM!; K!; SRGH); Inyanga, 1830-1980 m., fl. & fr. 30.X.1935, *Eyles* 8463 (K!; SRGH!); Stapleford, fl. & fr. 9.VI.1934, *Gilliland* 245 (K!; PRE!; SRGH!); Mt. Nuza, 1710 m.,

fl. & fr. 25.VI.1934, *Gilliland* 510 B (BM!; K!); Bundi Valley, Chimanimani Mts., Melsetter District, 1600 m., fl. 15.XI.1959, *Goodier* 634 (BM!; SRGH); Pungwe Hills, fl. 30.I.1939, *Hopkins* s. n. (SRGH!); Fairview, Melsetter District, 1830 m., fl. & fr. 20.VI.1945, *Hopkins* s. n. (K!; SRGH!); Penhalonga, c. 1220 m., fl. & fr. IV.1944, *Martineau* 364 (SRGH!); Mt. Peza, Chimanimani Mts., 1520 m., fl. & fr. 15.X.1950, *Munch* 273 (SRGH!); Inyangani Mt., fl. & fr. 14.XII.1952, *Munch* 393 (SRGH!); Stonehenge plateau, Chimanimani, Melsetter District, 1680 m., fl. 1.II.1957, *Phipps* 371 (SRGH!); Kloof above Troutbeck, 1980 m., fl. & fr. 24.XII.1951, *Whellan* 596 (SRGH!); Mountain Home, Umtali District, 1520 m., fl. 9.XII.1945, *Wild* 479 (SRGH!).

Open habitats, especially grassland.

Geranium incanum sensu lat. extends from the Cape in South Africa into Natal and the Transvaal. North of the Transvaal it occurs on the mountains near the borders of Southern Rhodesia and Mozambique, on the Nyika Plateau in Nyasaland and on the mountains in the southern part of Tanganyika (see Plate III). It is closely related to *G. vagans* Bak., which occurs in the Congo, Uganda, Kenya, Tanganyika and Nyasaland, chiefly differing in having leaves which are softly white-tomentose beneath, whereas *G. vagans* has leaves which are coarsely pilose below, the hairs mostly confined to the veins.

Geranium incanum is a very variable species, the shape of the leaves, the indumentum, the size of the petals, rostrum and stigmas all being subject to much variation. However the population of the species in a large part of the northern portion of its total range has undergone sufficient differentiation to be recognized as a distinct subspecies including the plants to which the specific names *G. nyassense* and *G. ukingense* have been applied. The epithet *nyassense* is chosen to designate the subspecies.

Subsp. *nyassense* has oblong-lanceolate leaf-segments as opposed to the linear leaf-segments of subsp. *incanum*. Subsp. *nyassense* does not merit the specific status formerly accorded to it in view of the presence of a few specimens with leaves intermediate between the two, for example *Exell, Mendonça &*

Wild 248 (BM!; COI!; LISC!; SRGH!) from Mozambique and *Moss* 4540 (BM!) from South Africa. Subsp. *nyassense* generally has shorter petals and a shorter and narrower rostrum than subsp. *incanum* but these characters are rather variable in the latter subspecies.

Subsp. *nyassense* occurs on the mountains near the Southern Rhodesia-Mozambique boundary, on the Nyika Plateau and in Tanganyika. Subsp. *incanum* occurs in the Union of South Africa from the Cape to the Transvaal, and apparently in the Njombe District of Tanganyika (see Plate III). Some other subspecies in Africa are reported to have a disjunct distribution similar to subsp. *incanum*. Thus *Anagallis serpens* Hochst. ex DC. subsp. *serpens* occurs only at the extremities of the total range of the species (see Taylor, P., 1955); subsp. *serpens* occurs in Ethiopia, Sudan and Southern Rhodesia, whilst subsp. *meyeri-johannis* (Engl.) P. Tayl. occurs in Uganda, Kenya and Tanganyika (Taylor, 1955). *Hibiscus diversifolius* Jacq. comprises two subspecies (Exell, 1961, p. 444); subsp. *diversifolius* is widespread in tropical and south Africa, Malagasey (Madagascar), India, Australia, New Caledonia and some Pacific Islands, whilst subsp. *rivularis* (Bremek. & Oberm.) Exell is confined to tropical Africa where it is known from Uganda, Tanganyika, Angola, Caprivi Strip, Bechuanaland Protectorate, Northern Rhodesia, Nyasaland and Mozambique; in the latter five areas (the Flora Zambesiaca area) it seems to entirely replace the type subspecies although the latter occurs to the north and south of the Zambesiaca area. In the case of *Geranium incanum* it would appear that the disjunct distribution of subsp. *incanum* came about through the south tropical elements of the species undergoing differentiation to form subsp. *nyassense* whilst the elements in South Africa and in the Njombe District underwent no such differentiation.

The specimens of subsp. *incanum* from Tanganyika are not identical in every respect with those from South Africa. The peduncles and sepals are densely glandular in the Tanganyika plants whilst specimens from South Africa are usually without glands. However some glandular specimens from South Africa occur, such as *Schelpe* 3059 from Drakensberg, Natal (BM!) and *Dieterlen* 316 from Basutoland (BM!, P). It should

be noted that subsp. *nyassense* also shows similar variation in the indumentum, specimens from Tanganyika and Nyasaland being always glandular, whilst plants from Southern Rhodesia are very variable, with the indumentum varying from densely glandular, as with *Sturgeon* s. n. (SRGH!), to eglandular and pubescent peduncles, as with *Chase* 1831 (BM!, SRGH!). Subsp. *incanum* in Tanganyika has a shorter and narrower rostrum than many specimens of the same subsp. from South Africa, but the Tanganyika material of subsp. *incanum* have longer stipules, longer stigmas and larger sepals than the Tanganyika material of subsp. *nyassense*. The following specimens from Tanganyika are referable to subsp. *incanum:*

TANGANYIKA: Southern Highlands Province: Njombe District: Elton Plateau, 2740 m., fl. 11.XI.1931, *Davies* E 3 (K!); 2400 m., fl. & fr. 19.X.1956, *Richards* 6588 (K!); Elton Plateau, 2400 m., fl. 7.I.1957, *Richards* 7563 (K!); Kipengere, Mtorwi Peak, 2610 m., fr. & fl. 12.I.1957, *Richards* 7706 (K!); Mdapo, fl. & fr. III.1954, *Semsei* 1658a (EA!; K!).

Geranium mascatense Boiss., Diagn. Pl. Or. Nov., **1** (1): 59 (1842); Fl. Or. **1**: 882 (1867). — Urb. in Jahrb. Königl. Bot. Gart. Berlin **3**: 240 (1884). — Schwein. in Bull. Herb. Boiss. **7**, app. 2: 268 (1899). Type: Arabia, Muscat and Oman, Jabal Al Akhadar, *Aucher-Eloy* 4303 (BM!, K!, isotypes).

Geranium mascatense var. *persicum* Pau in Trab. Mus. Nac. Cienc. Nat., ser. bot., **14**: 18 (1918). — Shamdani in Parsa, Fl. Iran, **1** (2): 1446 (1952). Type: Iran, Gotvand de Karoune, 1899, *M. de la Escalera* s. n. (K!, isotype).

IRAN: Gotvand de Karoune, fl. & fr. 1899, *M. de la Escalera* s. n. (K!).

MUSCAT and OMAN: Jabal Al Akhadar, fr., *Acher-Eloy* 4303 (BM!; K!); El Khorran, 25° 45′ N., 26° 10′ E., fl. & fr. II.1952, *Lee-Oldfield* 121 (BM!; EA!).

SUDAN: Kassala Province: Erkowit, 1220 m., fr. 3.III.1932, *Aylmer* 221 (K!); Karora hills, fl. & fr. II.1923, *Crowfoot* s. n. (K!); Hor Tamanib [near Suakin], fl. & fr. 27.II.1869, *Lord* s. n. (K!); Erkowit, fl. & fr. 1928, *Maffey* 9 p. p. (K!).

ERITREA: « gruppo dei monti Soyra, Monte Mamahot verso il torrente Arigot, m. 2800-3000 », fl. & fr. 23.VIII.1902, *Pappi* 1237 (BM!; EA!; SRGH!).

FRENCH SOMALILAND: Dai forest, 1370 m., fl. & fr. 2.II.1954, *Popov* 1291 (EA!; K!).

SOMALIA: fr., *Mrs. E. Lort Phillips* (K!).

Geranium mascatense is closely related to *G. ocellatum* Jacquem. ex Cambess., described in 1844, and *G. favosum* Hochst. ex A. Rich., described in 1847. All three differ from *G. trilophum* Boiss. and *G. yemense* Deflers in the absence of 2 dentate longitudinal dorsal crests on their fruiting-carpels. There are only small differences between the three species of the *G. mascatense* group and this has led to a good deal of confusion between them. The differences between the three plants are tabulated below:

	Outline of leaf-segments	*Colour of petals*	*Fruiting carpels*
G. mascatense	Obovate, pinnatifid	Purple pink with distinct dark purple centre	Tuberculate
G. ocellatum	Obovate, pinnatifid	Purple pink with distinct dark purple centre	Shallow reticulate ridges
G. favosum	Elliptic, pinnatipartite	Red to violet with violet veins	Tuberculate

The three species differ in geograghical distribution. *G. mascatense* occurs in Iran, Muscat and Oman and in Africa on the mountains bordering the Red Sea. *G. ocellatum* occurs in the Himalayas [China (Yunnan), Tibet, Nepal, Kashmir, Pakistan and India (Assam, Chota Nagpur, Uttar Pradesh)], Yemen and in Africa; in Africa the species occurs on Mt. Cameroon and the Bamenda plateau in the west and extends from Sudan, Eritrea and Somalia to Southern Rhodesia in the east. *G. favosum* is confined, so far as is known, to the continent of Africa, occurring in Sudan (Kassala), Eritrea and Ethiopia. It should be noted that all three species occur on the African mountains bordering the Red Sea. The distribution of *Geranium* species in Arabia is very incompletely known in view of the very small amount of collecting which has been carried out in the mountainous areas of Yemen and Muscat and Oman.

The treatment of these three annual species of *Geranium* in the latest, and probably the last, world monograph of *Geranium* (KNUTH, 1912), is unsatisfactory. KNUTH (1912, p. 62) unites *G. mascatense* with *G. ocellatum* under the later name, despite the difference in the fruiting carpels between the two plants and despite the fact that the name *G. ocellatum* was published two years after *G. mascatense* was described. Altogether, KNUTH gives four synonyms under *G. ocellatum*, one of which is, of course, *G. mascatense*. The other three synonyms given are *G. bicolor* Royle, *G. choorense* Royle and *G. omphalodeum* Lange. *G. bicolor* and *G. choorense* are synonyms of *G. ocellatum* but are both *nomina nuda*, whilst *G. omphalodeum* is validly published but no specimens are cited with the original description. However in the Kew Herbarium there is a specimen of *G. trilophum* Boiss. labelled: « *Geranium omphalodium* Lge (Ind. sem. hort. Haum.) Cultam Hauniae 2 Oct. 1879 Joh. Lange». It therefore appears probable that *G. omphalodium* is synonymous with *G. trilophum* and not *G. ocellatum*.

KNUTH (1912, p. 62) divides *Geranium ocellatum* into four varieties, each variety heing confined to a distinct geographical area. An examination of the material now available shows that there is no justification for dividing the species up in this manner, for, although the plant has a disjunct distribution, the isolated populations have undergone little or no differentiation.

Geranium favosum var. *sublaeve* Oliv. is synonymous with *G. ocellatum* and does not, as given by KNUTH (1912, p. 62), belong to *G. favosum*. The type specimen of *G. favosum* var. *sublaeve*, *Mann* 1261, from the Cameroons, is present in the Kew Herbarium.

KNUTH (1912, p. 61) describes *Geranium eritreae* R. Knuth and cites *Schweinfurth* 1276 from Eritrea as the type specimen. It is evident that this species is related to the *Geranium mascatense* group. Unfortunately I have been unable to see a type collection of this species and have seen no material named *G. eritreae*. If this name should prove to be a synonym it cannot affect the nomenclature of the *G. mascatense* group as it was not published until 1912.

Geranium mlanjensis Laundon **sp. nov.**

Geranium latistipulatum sensu Milne-Red. in Mem. N. Y. Bot. Gard. **8**: 231 (1953), non Hochst. ex A. Rich.

Herba perennis. *Caules* decumbentes pilosi vel pubescentes. *Folia* caulina, stipulis 4-7 mm. longis integris acuminatis pubescentibus, petiolo 0.5-16 cm. longo, longitudinaliter sulcato piloso vel pubescenti, lamina ad 3/4 vel profundius 5-loba, lobis basi 2-6 mm. latis ambitu obovatis, pinnatiloba, supra infraque pubescens. *Flores* in inflorescentias 1-floras pedunculatas, pedunculo 3-4 cm. longo pubescenti vel piloso dispositi, pedicellis 1-3 cm. longis pubescentibus; bracteae 3-5 mm. longae anguste lanceolatae acutae pubescentes. *Sepala* 6-8 × 2-3 mm. ovata vel elliptica mucronata pubescentes. *Petala* c. 10 × 5 mm. obovata apice retusa, pallide rosea. *Stamina* 10; filamenta c. 5 mm. longa anguste lanceolata basin versus, pubescentia; antherae atropurpureae. *Ovarium* tomentosum; styli 5, rosei. *Fructus* carpella laeves pilosae; columna stylaris adulta 15-17 × 1.5 mm., pubescens; stigmata 2-2.5 mm. longa. *Semina* glabra; testa vix profunde reticulata.

NYASALAND: Mt. Mlanje: Luchenya Plateau, 2100 m., fl. & fr. 11.VII.1946, *Brass* 16789 (K!; NY; SRGH!), fl. & fr. 1891, *Buchanan* 1018 (K!); Path from Little Ruo down to Naiwani, fl. & fr. 29.VII.1957, *Chapman* 467 (BM!; LISC!; SRGH!); Tuchila Plateau 1950 m., fl. & fr. 21.VII.1956, *Newman & Whitmore* 132 (BM!, holotype; SRGH!, isotype); Little Ruo Plateau, 1890 m., fl. 4.VIII.1956, *Newman & Whitmore* 332 (BM!; SRGH!); Plateau, fl. 10.XI.1913, *Shinn* 7 (BM!); 1830 m., fl. X.1891, *Whyte* 72 (BM!).

Known only from Mt. Mlanje. Borders of woodland, amongst scrub and in grassland. 1830-2100 m.

Geranium mlanjensis is closely related to *G. arabicum* Forsk. (*G. simense* Hochst. ex A. Rich.), and has entire ovate stipules which are identical with those of the latter species. *G. mlanjensis* differs from *G. arabicum* in having deeply divided leaves (pinnatilobed, see Plate IV), whereas in *G. arabicum* the leaves are shallowly cut (pinnatifid); a one-flowered inflorescence, whilst *G. arabicum* normally has a two-flowered inflo-

rescence although it is occasionally one-flowered by reduction; and in the colour of the petals. *G. arabicum* has petals which are white or pink (rarely pale purple) with prominent red veins, whilst the petals of *G. mlanjensis* are pink with veins which are the same colour as the petals themselves and are, therefore, inconspicuous.

Geranium mlanjensis differs from *G. latistipulatum* Hochst. ex A. Rich., a species allied to *G. arabicum*, occurring in Eritrea, Ethiopia, Kenya and Tanganyika, in leaf-shape, the lobe of the leaves of *G. mlanjensis* being divided to about half-way (pinnatilobed) whilst in *G. latistipulatum* the leaves are divided nearly to the midrib (pinnatipartite), narrower stylar column (1.5 mm. broad in *G. mlanjensis*; 2 mm. broad in *G. latistipulatum*) and longer stigmas (2-2.5 mm. in *G. mlanjensis*; 1-1.5 mm. in *G. latistipulatum*).

Since *Geranium mlanjensis* is clearly closely related to *G. arabicum* and confined to Mt. Mlanje it might at first appear that it should be regarded as a geographical subspecies of *G. arabicum*. However, specimens of *G. arabicum* have been collected on Mlanje (1830 m., fl. 1939, *Forbes* 12, EA!; Tuchila Plateau, 1830 m., fl. & fr. 26.VII.1956, *Newman & Whitmore* 195, BM!, SRGH!) thus proving that *G. mlanjensis* cannot be regarded as a geographical variant of *G. arabicum*. The specimens of *G. arabicum* from the mountain (*Forbes* 12; *Newman & Whitmore* 195) are typical in every respect even down to the two-flowered inflorescences and the colour of the petals (see the remarks on the *Newman & Whitmore* 195 label: «Corolla pale pink, prominent deep pink veins»).

Geranium vagans subsp. **whytei** (Bak.) Laundon, **stat. nov.**

Geranium whytei Bak. in Bull. Misc. Inf., Kew **1898**: 302 (1898). — R. Knuth in Engl., Pflanzenr. IV, 129: 208 (1912). Syntypes: Nyasaland, Zomba, *White* s. n. (K!, syntype); Mt. Malosa, *Whyte* s. n. (K!, syntype).

Geranium linearilobum R. Knuth in Jahres.-Ber. Schles. Ges., Breslau, **81** (1903), IIb Zool.-bot. Sekt.: 17 (1904) pro parte, quoad specim. Whyte. Lectotype: Nyasaland, Mt. Zomba, *Whyte* (K!).

NYASALAND: Mt. Malosa, 1220-1830 m., fl. & fr. XI-XII. 1896, *Whyte* s. n. (K!, syntype). Zomba Mountain, fl. & fr. 5.III.1956, *Banda* 206 (BM!; LISC!); fr., *Buchanan* 291 (K!); fr., Central Peak, *Cunningham* s. n. (K!); 1220-1830 m., fl. & fr. XII.1896, *Whyte* s. n. (K!, syntype).

Known only from Mt. Malosa and Zomba Mountain. Grassland.

R. Knuth (1912, p. 202) distinguishes *Geranium whytei* from *G. vagans* Bak. by the presence of an elongated middle segment of each lobe of the leaf in the former species. An examination of a large number of specimens shows that there is every gradation in the length of the middle segments of the lobes of the leaves and this character cannot, therefore, be used to differentiate between *G. whytei* and *G. vagans*.

All the specimens from Mt. Malosa and Zomba Mountain have a stylar column which is densely pilose and completely devoid of glands, whilst all the specimens from the remaining area in which the species occurs have a stylar column which is densely glandular. It thus appears that geographical differentiation has taken place and therefore *Geranium whytei* can be regarded as a subspecies. Thus subsp. *vagans* occurs on the mountains in the Congo, Uganda, Kenya, Tanganyika and on the Nyika Plateau in Nyasaland, whilst subsp. *whytei* is confined to M. Malosa and Zomba Mountain in Nyasaland, occurring only at the southern extremity of the total range of the species (see Plate V).

Hedberg (1957, p. 293) has already pointed out that *Geranium angustisectum* R. Knuth and *G. schliebenii* R. Knuth are synonymous with *G. vagans*. Both belong to the subsp. *vagans*.

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Photograph of the lectotype specimen of *Geranium arabicum* Forsk.
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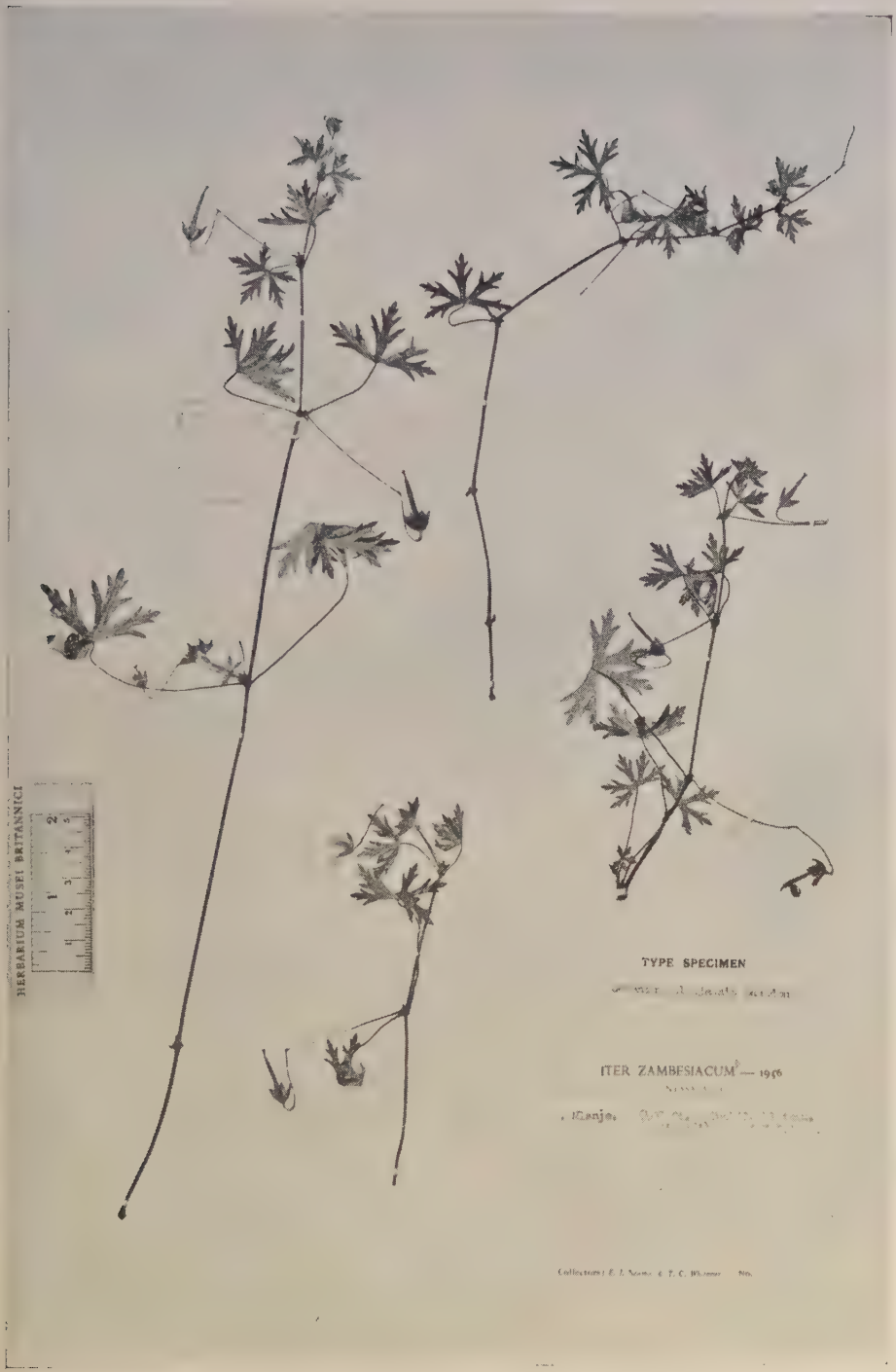
Photograph of the holotype specimen of *Geranium exellii* Laundon (*Exell, Mendonça & Wild* 109).

Map showing distribution of *Geranium incanum* Burm. f. subsp. *incanum* and *G. incanum* subsp. *nyassense* (R. Knuth) Laundon.



Photograph of the holotype specimen of *Geranium mlanjensis* Laundon (*Newman & Whitmore* 132).

Map showing distribution of *Geranium vagans* Bak. subsp. *vagans* and *G. vagans* subsp. *whytei* (Bak.) Laundon.

SUR UN GÈNE CONTRÔLANT LA TAILLE DES CHROMOSOMES A LA PREMIÈRE MITOSE DU POLLEN

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INTRODUCTION

COMME les autres processus physiologiques ayant lieu chez les êtres vivants, les mécanismes de la mitose et de la méiose sont contrôlés par le génotype. En effet, on connaît aujourd'hui quelques gènes, en général récessifs, responsables par des anomalies survenues à ces divisions nucléaires, parmi lesquelles Moh et Nilan (1954) mentionnent l'asynapsis chez quelques plantes, le manque de crossing-over dans tous les chromosomes de *Drosophila melanogaster*, des mitoses surnuméraires, des chromosomes « sticky », le manque de cytocinèse chez *Zea mays* et la formation de fuseaux méiotiques anormaux chez la même plante.

Lesley et Frost (1927) ont montré l'existence chez *Matthiola* de deux races, une possédant des chromosomes courts et l'autre des chromosomes longs à la métaphase de la division hétérotypique. En démontrant que ces caractères subissent la ségrégation mendélienne et que le caractère chromosomes courts domine chromosomes longs, ils ont mis en évidence, pour la première fois, l'existence d'un gène qui contrôle le degré de spiralisation des chromosomes à la division hétérotypique.

En étudiant une population d'*Hordeum vulgare* var. Trebi, qui a été soumise à l'action de la radiation d'une bombe atomique à Bikini en 1946, Moh et Nilan (1954) ont trouvé un mutant caractérisé par l'extrême condensation des chromosomes à la diacinèse de la microsporogenèse. Ces auteurs ont établi de plus que ce caractère est contrôlé par un gène récessif.

Le 14 mars 1959, nous avons récolté à Pinheiro de Cima, alentours de Mangualde (Beira Alta), une population de *Narcissus bulbocodium* L. chez laquelle nous avons trouvé un individu dont les grains de pollen ont montré, à la première mitose, des figures à chromosomes longs normaux et d'autres à chromosomes courts. Une nouvelle récolte a été faite chez la même population au commencement de 1961, dans le but de trouver d'autres plantes du même type. Nos efforts ont été couronnés de succès, puisque nous avons réussi à séparer 4 individus. Nous rapportons ici les observations effectuées qui, à notre connaissance, fournissent le premier exemple de l'action d'un gène sur le comportement des chromosomes à la première cinèse du pollen.

MATÉRIEL ET TECHNIQUE

Les plantes récoltées à Pinheiro de Cima ont été isolées et mises en pots au Jardin Botanique de Coimbra et, en 1960 et 1961, elles ont fourni des fleurs qui ont été fixées à l'alcool acétique (3:1). Ensuite, le matériel a été transféré dans l'alcool à 70 %, en attendant l'opportunité d'être étudié.

Nous n'avons employé que des préparations temporaires, obtenues au moyen de la dissociation des anthères dans des gouttes de carmin-acétique. Après l'application du couvre-object, les préparations étaient légèrement chauffées sur une flamme et ensuite lutées à la paraffine. Les photos ont été prises par l'emploi d'un Cytophot Bush.

OBSERVATIONS

L'étude de la première mitose des grains du pollen nous a révélé l'existence de quatre types d'individus dans la population de Pinheiro de Cima:

A — *Individus normaux* — Les plantes de ce type, qui constituaient la grande majorité, présentent seulement des métaphases à 7 chromosomes (Pl. I, fig. *a*), correspondant à la garniture haploïde normale de cette espèce qui a été établie dans des travaux antérieurs (Fernandes, 1934, 1936, 1948) comme étant représentée par la formule suivante:

$$n = 1\ Lp_1 + 1\ Lp_2 + 1\ Lp_3 + 1\ lm + 2\ PP + 1\ Pp'$$

Les chromosomes possèdent toujours la longueur normale et la mitose a lieu régulièrement (Pl. I, fig. *b*), aboutissant à la formation d'une cellule gamétogène du côté moins bombé du grain et d'une cellule du tube placée de l'autre côté (Pl. I, fig. *c*).

B — *Individus à hétérochromatinosomes* — Chez les individus n.^{os} 5 et 12, nous avons constaté l'apparition de plaques à 7 et à 8 chromosomes. Chez le n.° 5, l'élément surnuméraire était dans toutes les figures un chromosome long à constriction subterminale (Pl. I, fig. *d*). Il s'agit donc d'une plante à 15 chromosomes. Chez le n.° 12, il y avait des plaques à surnuméraire court (Pl. I, fig. *e*) et d'autres à surnuméraire plus long (Pl. I, fig. *f*). Cette plante a donc 16 chromosomes, c'est-à-dire elle est pourvue de deux surnuméraires à type différent. Soit dans la plante n.° 5, soit dans la n.° 12, la cinèse se déroulait normalement, présentant les hétérochromatinosomes un comportement semblable à celui que nous avons décrit dans un travail antérieur (Fernandes, 1948).

C — *Individus à chromosomes normaux et à chromosomes condensés* — Ces plantes nous ont montré dans la même anthère deux types de cinèses. Un des types était entièrement régulier, avec la formation de 7 chromosomes normaux (Pl. I, fig. *g*), qui se séparaient normalement à l'anaphase (Pl. I, fig. *h*, *i*), tandis que l'autre présentait des chromosomes extrêmement condensés, rappelant les chromosomes de la division hétérotypique. Le cours de la cinèse du deuxième type mérite d'être décrit avec quelque détail à partir de la métaphase (1).

Les figures de cette phase (Pl. II, fig. *a*) montrent 7 chromosomes — 4 plus longs et 3 plus courts — beaucoup plus raccourcis que dans les cas normaux (Pl. I, fig. *g-i*). Ce raccourcissement s'accentue jusqu'au commencement de l'anaphase, moment où certaines figures (Pl. II, fig. *b*) semblent montrer qu'une division transversale des chromosomes a lieu. L'observation de figures plus favorables (Pl. II, fig. *c*) montre, cependant, que la division est longitudinale. Quelquefois, les centro-

(1) La distinction entre les figures appartenant aux deux types de cellules n'est pas possible avant la métaphase.

mères de tous les chromosomes se clivent simultanément (Pl. II, fig. *c*) et deux groupes à 7 chromosomes se séparent vers les pôles (Pl. II, fig. *d*). Cependant, ce phénomène semble être rare, puisque le plus souvent les centromères ne se clivent pas en même temps. En effet, nous avons constaté non seulement que les chromatides de certains chromosomes se séparent plus tôt que ceux d'autres (Pl. II, fig. *b*, *e*), mais aussi qu'il y a fréquemment formation de retardataires. Ainsi, les figures *f*, *g*, *h* de la Pl. II montrent un retardataire chacune, situé sur le plan équatorial, dont les chromatides ne sont pas encore séparés. La figure *i* de la Pl. II en montre deux. Quelquefois, les chromatides de ces chromosomes subissent la disjonction et ils peuvent être inclus dans les groupes polaires respectifs. Dans d'autres cas, la mitose est plus irrégulière, puisque des chromosomes, en nombre variable, ne réussissent pas à se mettre au plan équatorial (Pl. III, fig. *a*). Les chromatides de ces chromosomes peuvent ne se séparer pas et des groupes à nombres chromosomiques irréguliers en résultent.

Dans cette cinèse, le fuseau peut avoir une position semblable à celle qu'il occupe dans les grains de pollen normaux, c'est-à-dire une position selon l'axe transversal du grain (Pl. II, fig. *b*, *i*). Plus fréquemment, cependant, il se développe suivant l'axe longitudinal (Pl. II, fig. *c*, *d*, *e*, *g* et Pl. III, fig. *a*) ou il présente une position plus ou moins oblique (Pl. II, fig. *f*, *h*). Dans quelques cas, il est courbe et la courbure s'accentue vers les extrémités (Pl. II, fig. *e*). D'autre part, nous avons constaté que les fibrilles sont peu marquées, bien qu'il s'agit de matériel conservé pendant longtemps à l'alcool à 70 % après fixation à l'alcool-acétique. Les deux noyaux du grain de pollen de la fig. *e*, Pl. IV pourraient avoir été engendrés par suite d'une cinèse à chromosomes condensés et à fuseau longitudinal.

Dans une anthère de la plante n.° 1 (celle qui a été récoltée en 1959), nous avons réussi à trouver 67 anaphases. Leur étude nous a amené à établir que 32 appartenaient au type de chromosomes normaux et 35 à celui de chromosomes condensés. Ces nombres nous autorisent à penser à une ségrégation selon la proportion 1 : 1. En admettant une telle ségrégation, une valeur de $\chi^2 = 0{,}13432$ a été obtenue. Étant donné qu'à ce χ^2 correspond une valeur de P à peu prés égale à 0,70, on

constate qu'il y a un accord étroit avec l'hypothèse formulée d'après laquelle la ségrégation des caractères chromosomes normaux-chromosomes condensés se fait selon la proportion 1:1.

En dehors des grains à 7 chromosomes, nous avons rencontré dans cette anthère quelques autres ayant le nombre diploïde, c'est-à-dire 14. Nous avons constaté que, comme il arrivait dans les grains haploïdes, il y avait dans leurs divisions des figures à chromosomes normaux (Pl. III, fig. *b, g*) et d'autres à chromosomes raccourcis (Pl. III, fig. *h*). Dans les grains du premier type, la mitose découlait sans irrégularités (Pl. III, fig. *g*), tandis que dans ceux du deuxième il y avait des anomalies comparables à celles décrites pour les grains à 7 éléments raccourcis (Pl. III, fig. *h*).

D — *Individus ayant simultanément des chromosomes normaux, des chromosomes condensés et des hétérochromatinosomes* — Trois plantes ont été trouvées possédant des hétérochromatinosomes (Pl. III, fig. *c*), ainsi que des grains de pollen à chromosomes normaux et d'autres à chromosomes condensés. La mitose dans les grains à chromosomes normaux est régulière. Dans les grains à chromosomes courts, nous avons identifié: 1) une anaphase engendrée par un grain à 7 éléments, qui présentait un retardataire au plan équatorial (Pl. III, fig. *d*); 2) des métaphases à 8 chromosomes (Pl. IV, fig. *b*); 3) des stades initials d'anaphases aussi à 8 chromosomes (Pl. IV, fig. *a*); 4) des stades plus avancés de l'anaphase dans des cellules à 8 éléments, mais montrant soit un (Pl. IV, fig. *c, d*), soit deux retardataires clivés longitudinalement (Pl. III, fig. *e*). Il est à remarquer que, sur les figures à 8 éléments, tous les chromosomes se présentent raccourcis, ce qui montre que les hétérochromatinosomes se comportent d'une façon semblable à celle des euchromatinosomes.

Malheureusement, nous n'avons pas réussi à examiner les chromosomes des méristèmes radiculaires des plantes possédant simultanément dans les anthères des figures à chromosomes normaux et à chromosomes courts. Cependant, nous avons examiné quelques métaphases et anaphases dans les cellules des parois des anthères. Ces figures nous ont montré toujours des chromosomes à taille normale (Pl. III, fig. *f*).

DISCUSSION

Comme nous avons constaté que la ségrégation a lieu d'après la proportion 1 : 1, il est évident que les caractères chromosomes longs (normaux) et chromosomes condensés sont sous l'action d'une paire de gènes qui contrôle la taille des chromosomes, c'est-à-dire le degré de spiralisation subie par ces éléments.

Est-ce que le gène déterminant le caractère chromosomes condensés est dominant ou récessif? Par le fait que les chromosomes somatiques des plantes hétérozygotes présentent une taille normale, il est probable que ce gène soit récessif. Cependant, l'existence de grains de pollen diploïdes à chromosomes condensés semble montrer que le gène est dominant. S'il en était ainsi, tous les grains diploïdes devraient montrer des chromosomes raccourcis, ce qui n'arrive pas, puisque nous avons trouvé aussi des métaphases et des anaphases diploïdes à chromosomes normaux. De cette façon et étant donnée la taille des chromosomes somatiques, nous croyons plutôt que nous sommes en présence d'un gène récessif et, par conséquent, que les plantes auront la constitution c^+c. La formation de grains de pollen diploïdes à chromosomes condensés par les plantes c^+c pourrait avoir lieu au moyen des processus suivants: 1) crossing-over entre des chromatides porteurs des gènes c^+ et c dans des cellules-mères dont la division hétérotypique avorte pour engendrer des grains de pollen non réduits; 2) formation de grains de pollen non réduits par manque de la deuxième division; 3) existence de cellules-mères diploïdes. Nous considérons le dernier processus comme étant le plus probable.

D'après Darlington (1956), le fuseau est engendré par l'action de tous les centromères des chromosomes de la garniture. S'il en est ainsi, le gène apparu chez *Narcissus bulbocodium* agit sur les centromères en les rendant moins actifs, puisque le fuseau présente des irrégularités non seulement en ce qui concerne sa position, mais aussi quant au degré de différenciation des fibrilles. La formation fréquente de retardataires et le manque de séparation des chromatides qui arrive aussi quel-

quefois sont, à notre avis, des symptômes indicateurs de la faiblesse des centromères.

Nous ne savons pas encore si le gène agit directement sur la spiralisation en la poussant davantage que dans les chromosomes méiotiques, ou bien si ce haut degré de spiralisation est une conséquence de l'affaiblissement des centromères. En effet, en admettant cet affaiblissement, la différenciation du fuseau serait retardée, ce qui donnerait lieu à qui les phénomènes de spiralisation puissent se poursuivre pendant plus de temps que dans les cellules normales et, de ce fait, des chromosomes très condensés en résulteraient. D'autre part, des centromères faibles engendreraient des fuseaux défectueux. Ces anomalies anaphasiques seraient donc, en dernière analyse, dues à la diminution de l'activité des centromères, qui amènerait la formation de fuseaux qui ne fonctionneraient pas d'une façon parfaite.

Bien que la première mitose soit irrégulière, des noyaux de cellules gamétogènes à 7 chromosomes doivent quelquefois s'engendrer dans les grains de pollen à chromosomes condensés (Pl. IV, fig. *e*). Ces noyaux sont fonctionnels, puisque nous avons trouvé jusqu'à présent 5 plantes à constitution c^+c et nous ne pourrons pas admettre que toutes ces plantes aient résulté d'un individu original au moyen de la multiplication végétative, par les raisons suivantes: 1) les récoltes ont été effectuées à deux années différentes et la probabilité des plantes de la deuxième année avoir été recueillies exactement dans le même groupe de plantes engendrées par multiplication végétative auquel appartenait l'individu rencontré pendant la première récolte sont presque nulles; 2) les plantes c^+c n'avaient pas toutes la même constitution, puisque il y avait parmi elles des plantes dépourvues d'hétérochromatinosomes et d'autres pourvues soit d'un, soit de deux de ces éléments.

Par le fait qu'il y a des plantes c^+c pourvues d'un ou de deux hétérochromatinosomes et d'autres qui en sont dépourvues, il semble qu'il n'y a aucun rapport entre le gène *c* et le gène *H* qui contrôle la conversion de l'euchromatine provocant du déséquilibre génique en hétérochromatine (vide Fernandes, 1943, 1948). L'apparition de figures à 8 (métaphases) et à 16 éléments (anaphases) tous condensés dans les plantes pourvues d'un

hétérochromatinosome surnuméraire montre que le gène *c* agit d'une façon semblable sur l'euchromatine et sur l'hétérochromatine.

RÉSUMÉ ET CONCLUSIONS

1. L'étude de la première mitose dans les grains du pollen de quelques plantes d'une population de *Narcissus bulbocodium* L., récoltées aux alentours de Mangualde (Beira Alta) nous a amené à mettre en évidence l'existence des types d'individus suivants: 1) normaux à chromosomes longs (la majorité); 2) normaux à chromosomes longs pourvus d'hétérochromatinosomes surnuméraires (un ou deux); 3) dépourvus d'hétérochromatinosomes, mais montrant dans la même anthère des figures à chromosomes longs normaux et d'autres à chromosomes extrêmement condensés; 4) semblables au type précédent, mais ayant des hétérochromatinosomes surnuméraires (un ou deux).

2. Les plantes les plus intéressantes sont celles présentant simultanément dans la même anthère des grains à chromosomes longs et d'autres à chromosomes extrêmement raccourcis. Le dénombrement des figures de ces deux types montre que la ségrégation se fait d'après la proportion 1:1 ($\chi^2 = 0{,}13432$ et P à peu près égal à 0,70). La taille des chromosomes à la première mitose du pollen est donc contrôlée par une paire de gènes et quelques plantes de la population sont des hétérozygotes c^+c.

3. Par le fait que les chromosomes somatiques des plantes hétérozygotes présentent une longueur normale, il est probable que le gène responsable du raccourcissement soit récessif. L'apparition de quelques grains de pollen diploïdes à chromosomes aussi condensés semblerait montrer que le gène est dominant. Cette supposition, cependant, ne s'accorde pas avec le fait qu'il y a aussi des grains diploïdes à chromosomes longs. En admettant que le gène contrôlant l'extrême degré de raccourcissement des chromosomes est récessif, la formation de grains diploïdes à chromosomes condensés pourrait résulter soit du crossing-over entre des chromatides porteurs des gènes

c^+ et *c* dans des cellules-mères dont la division hétérotypique avorte, soit du manque de la deuxième division, soit encore de l'existence de cellules-mères du pollen tétraploïdes.

4. Étant donné que le fuseau est défectueux dans les cellules à chromosomes condensés et que les anaphases sont irrégulières avec fréquente formation de retardataires, nous pourrons supposer que l'action du gène *c* s'exerce sur les centromères des chromosomes de la garniture en les rendant moins actifs. Cette diminution d'activité aurait par conséquence une différenciation tardive du fuseau qui amènerait la continuation des phénomènes de spiralisation pendant un temps plus long que le normal. D'autre part, les centromères faibles et les fuseaux défectueux seraient les responsables des anomalies constatées à l'anaphase.

5. Il est probable que le gène *c* n'aura aucun rapport avec le gène *H* contrôlant la quantité de chromatine active qu'on trouve aussi chez quelques populations de *N. bulbocodium*.

6. Le gène *c* agit d'une façon semblable sur l'euchromatine et sur l'hétérochromatine.

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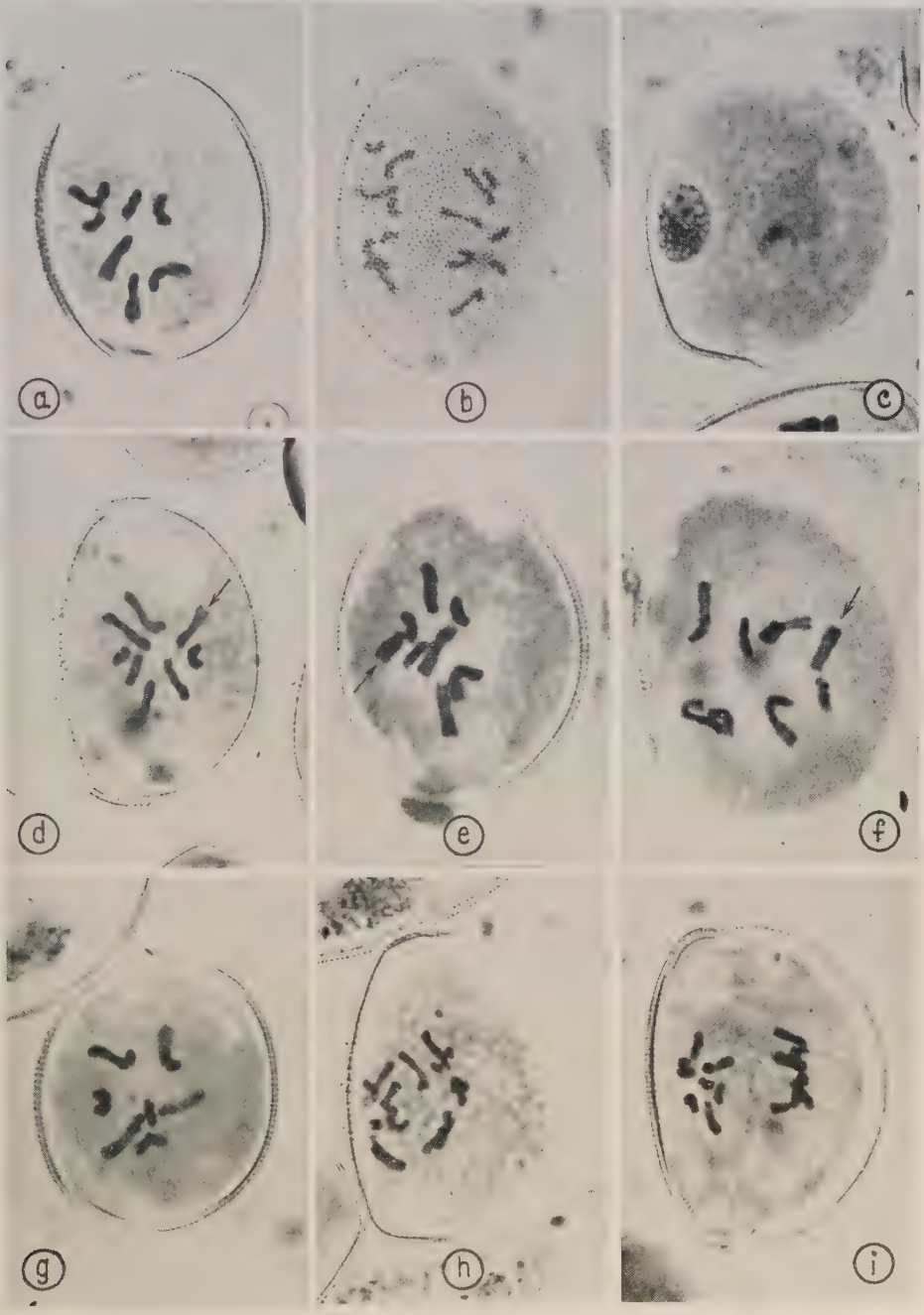
PLANCHES

Planche I

Première mitose du pollen chez *Narcissus bulbocodium* L.

a — Plaque équatoriale chez une plante normale (7 chromosomes).
b — Anaphase, idem.
c — Grain de pollen après la première cinèse, montrant la cellule gamétogène et la cellule du tube.
d — Plaque équatoriale pourvue d'un hétérochromatinosome surnuméraire long (flèche) chez la plante n.º 5.
e — Plaque équatoriale à surnuméraire relativement court (flèche) chez la plante n.º 12.
f — Idem à surnuméraire plus long (flèche) chez la même plante.
g — Plaque équatoriale à chromosomes normaux chez une plante possédant des chromosomes à taille normale et d'autres condensés.
h — Anaphase, idem.
i — Stade un peu plus avancé que celui de la figure précédente.

× 900.


a
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c
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Planche II

Première mitose du pollen chez *Narcissus bulbocodium* L. montrant des chromosomes condensés.

a — Plaque équatoriale.
b — Début de l'anaphase simulant une division transversale des chromosomes. Remarquer le fuseau transversal et que, comme il arrive quelquefois à l'anaphase de la division hétérotypique, les chromosomes plus courts se séparent plus tôt que les plus longs.
c — Début de l'anaphase à fuseau longitudinal, montrant nettement qu'il s'agit d'une division longitudinale des chromosomes.
d — Stade plus avancé d'une anaphase (fuseau longitudinal), avec la formation de deux groupes à 7 chromosomes. Remarquer que, dans la moitié inférieure, deux des chromosomes sont très proches.
e — Début de l'anaphase à fuseau longitudinal et courbe.
f — Anaphase à fuseau oblique, montrant un retardataire (flèche).
g — Idem à fuseau longitudinal, montrant aussi un retardataire (flèche).
h — Idem à fuseau oblique et à retardataire (flèche) sur le plan équatorial.
i — Idem à fuseau transversal et à deux retardataires (flèche).

× 900.

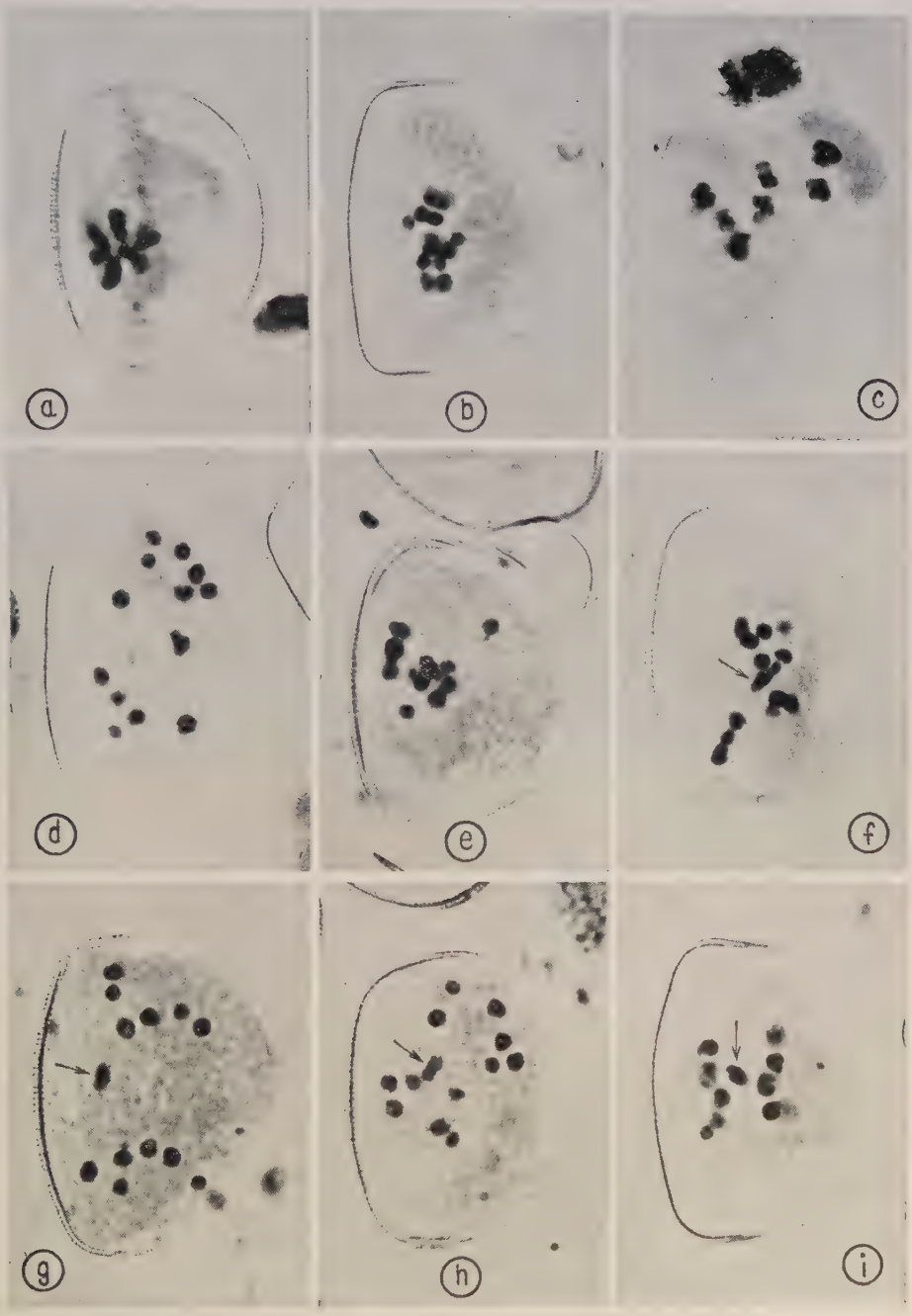
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Planche III

Première mitose du pollen chez *Narcissus bulbocodium* L.

a — Anaphase à fuseau longitudinal, montrant tout au moins deux chromosomes dont les chromatides ne se sont pas séparés (flèches).

b — Plaque équatoriale dans un grain de pollen diploïde ($2x = 14$) à chromosomes normaux.

c — Idem à 8 éléments (le surnuméraire, indiqué par la flèche, est un hétérochromatinosome).

d — Anaphase à chromosomes courts dans une plante pourvue d'hétérochromatinosomes. Cette figure a été engendrée par un grain de pollen dépourvu d'hétérochromatinosome. Remarquer un retardataire (flèche) au plan équatorial.

e — Anaphase dans un grain à 8 éléments montrant deux retardataires (flèche).

f — Anaphase dans une cellule de la paroi de l'anthère.

g — Anaphase dans un grain diploïde à chromosomes normaux.

h — Idem dans un grain diploïde à chromosomes condensés.

× 900.

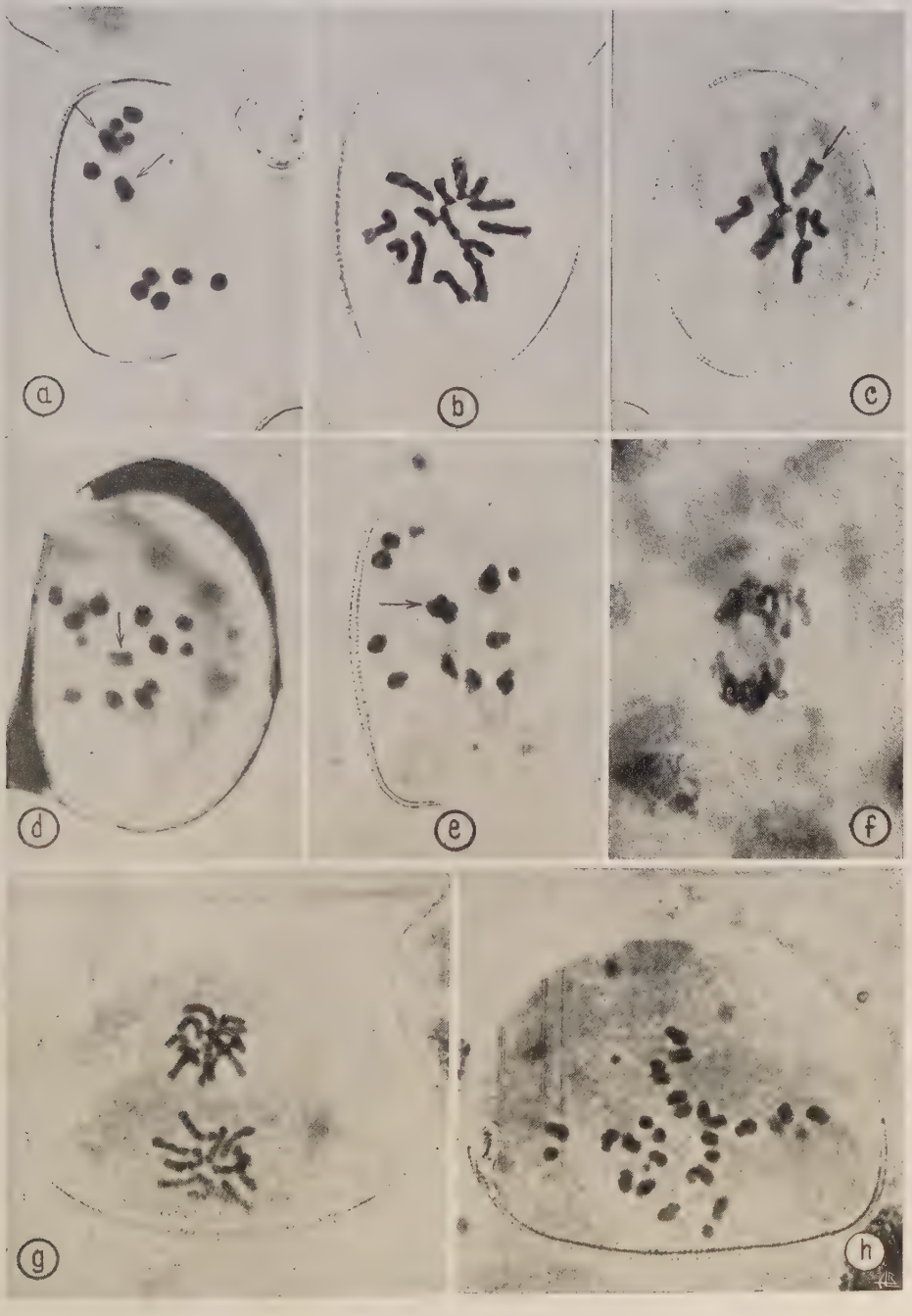
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Planche IV

Première mitose du pollen chez *N. bulbocodium* L.

a et *b* — Début de l'anaphase dans des grains de pollen à hétérochromatinosome surnuméraire. Remarquer que tous les chromosomes sont raccourcis.

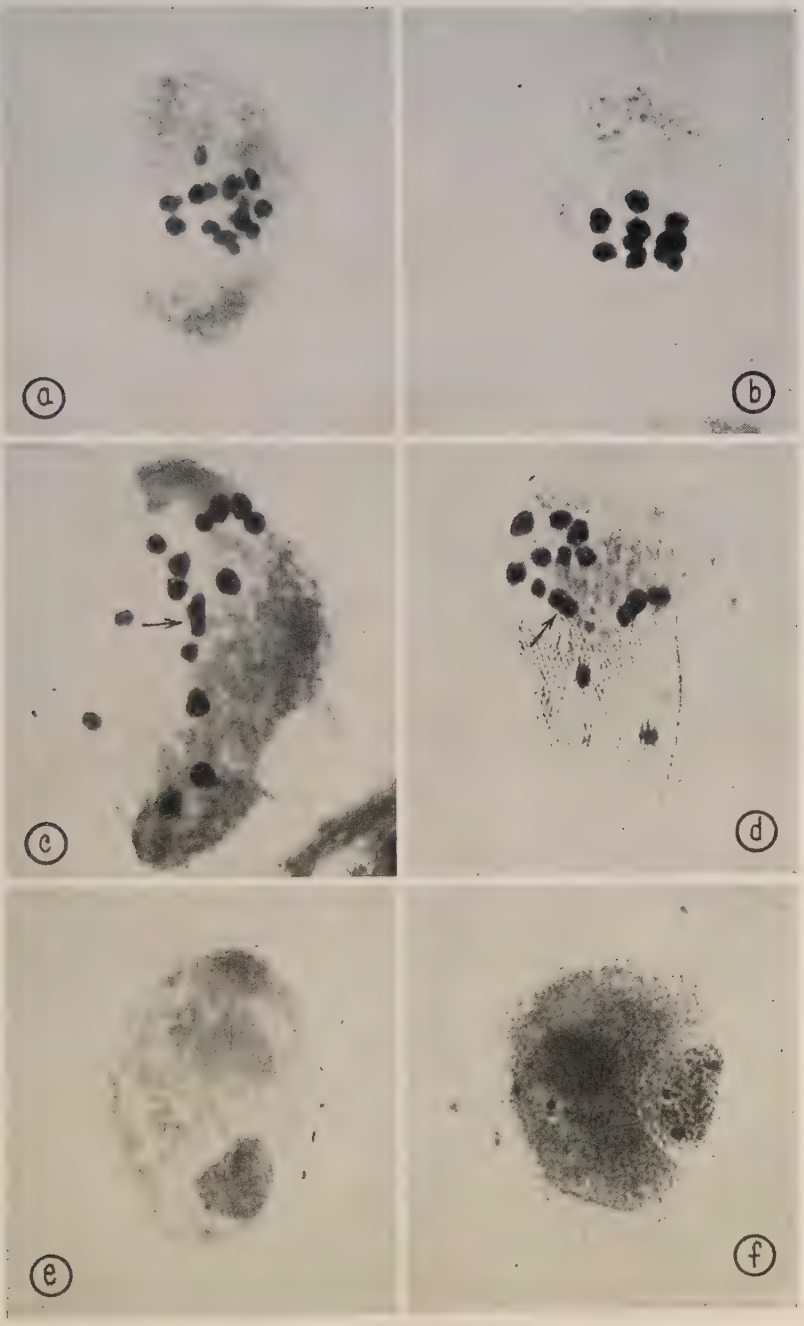
c — Anaphase dans un grain de pollen pourvu d'un hétérochromatinosome. Remarquer que tous les chromosomes sont condensés et qu'il y a un retardataire, indiqué par la flèche.

d — Idem.

e — Grain de pollen à deux cellules qui pourriont avoir été engendrées par suite d'une cinèse à chromosomes condensés et à fuseau longitudinal.

f — Grain de pollen dont les noyaux des cellules gamétogène et du tube montrent deux hétérochromatinosomes chacune.

× 900.


a
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NOTES ON SOME PORTUGUESES SPECIES OF *CALLITRICHE*

by

HENRIETTE D. SCHOTSMAN

INTRODUCTION

FROM a botanical point of view Portugal is in many respects an interesting territory. As part of the Iberian Peninsula it belongs, on the one hand, to a meeting-place where Northern European, Mediterranean and Amphi-Atlantic elements come together. On the other hand the Pyrenees have formed a boundaryline which has not been passed by many European species growing to the north of it, and which, at the same time, has been the cause that numerous endemics have arisen in the isolated area.

The climatic differences in Portugal between the northern and southern, the eastern and western parts, combined with topographical differences in altitude and in chemical constitution of the soil, offer very varied environment conditions to the flora. Not only for land-plants, but also for water-plants, this south-western corner of Europe is therefore an important area for investigations.

As to the *Callitriche* genus, the great differences in environment create very favourable conditions for the occurrence of different species, as well as for the development of land-, water- and transitional forms. We may here mention e. g. the « poços » — small and deep water-basins with clear water, as they are found in the eastern mountain-area —, the banks and sandbanks of the rivers, falling dry in summer, the lagoons in the coastal area. All these areas sometimes show — especially in spring and early summer — an unparalleled profuseness of

certain species of *Callitriche* in various stages of development and in various habits.

This plentiful manifestation — an abundance that is indeed characteristic for the whole of Portugal's colourful flora — makes *Callitriche* locally to an almost spectacular plant. This may be one of the causes why it has, up to the present, attracted the attention of botanists in this country and why it has been regularly collected. For in contrast with several other European countries, the Portuguese collections contain valuable material also from recent times.

According to the statements in the literature several species of *Callitriche* occur in Portugal.

Brotero (1804) made mention of *C. hermaphroditica.* Also Sampaio (1947) and Mendes (1952) state that this species is indigenous. In Pereira Coutinho's «Flora de Portugal (1939)» we find *C. platycarpa, C. stagnalis, C. verna, C. truncata* and *C. pedunculata.* Moreover, Rosette Fernandes (1956) mentions *C. hamulata,* which had also been referred by Sampaio. It is a striking fact that no mention is made of *C. obtusangula,* a species whose typical distribution area comprises the Mediterranean-Atlantic coastal area.

Both the occurrence of the species by the authors mentioned above and the apparent absence of *C. obtusangula* gave rise to many questions connected with the areals so far known of these species. Other subjects for further investigations comprised cultivation-experiments and caryology of *C. pedunculata* and *C. hamulata,* as these two are often difficult to distinguish on purely morphological grounds; caryological and morphological examinations of *C. truncata,* in order to make a start with a more comprehensive investigation of this very complicated «species», comparisons of caryotypes of different populations within one species, e. g. in *C. stagnalis.*

These and some other problems have been the basis of this study of the Portuguese *Callitriche* species. Naturally it is still very incomplete. While some query-marks could be crossed out, several new ones have often had to be placed. It may be a starting-point, however, for further investigations in this important region.

The great polymorphism of most species of the *Callitriche* genus often make identification, especially of non-fructifying plants, very difficult. Elsewhere (1954, 1958) we went fully into this matter.

Water- and land-forms, winter- and summer-forms, forms from deep and from shallow water, may differ within one species to such an extent that they can hardly be recognized as forms of that particular species. On the other hand some habits of different species resemble each other so closely that one cannot give a final determination without cultivation and caryological investigation. As a result of this, herbarium investigation meets with many difficulties, and time after time it becomes apparent how important caryology and cultivation experiments are for demarcating the limits of the species as accurately as possible — on the ground of a combination of a number of factors that should be as great as possible. The caryological data, as far as concerning the external morphology of the chromosomes, should be handled cautiously, however, when used as identification characters, as it has become evident that different populations within one species may have different caryotypes.

As to the morphological characteristics of flowering and fructifying specimens, the characteristics of the ripe fruits are the most important. Besides the general shape, position of the rests of the style, presence or absence of a wing, also smaller details, in the present case cell structure of the endocarp, may be of great importance. Valuable indications may be had, moreover, from e. g. the shape of the stem glands and of the pollen grains. In the species of Hegelmaier's section *Eucallitriche* (1) (*C. stagnalis, C. palustris, C. platycarpa, C. obtusangula, C. cophocarpa, C. hamulata* and *C. pedunculata*) the shape of the leaves is practically only valuable as an identification character in extremely well-developed, flowering specimens. In taxa from the section *Pseudocallitriche,* as e. g. *C. hermaphroditica* and *C. «truncata»* the leaves are less liable to modification; consequently in this group the shape of the leaves may be of greater importance.

(1) This section corresponds partly to the section *Callitriche,* mentioned by *Fassett* (1951).

MATERIAL AND METHOD

During our stay at the Coimbra Botanical Institute the following species of *Callitriche* were investigated: *C. obtusangula, C. stagnalis, C. pedunculata, C. truncata, C. lusitanica* and *C. deflexa.* The last-mentioned species was found in pot-cultures of *Narcissus* and *Ornithogalum* in the Hortus Botanicus; *C. stagnalis, C. obtusangula, C. pedunculata* and *C. truncata* were collected during excursions in the surroundings of Coimbra, in the coastal area and the mountainous country of Serra da Estrela. Unfortunately it has not been possible to collect *C. lusitanica* alive.

C. pedunculata and *C. deflexa* were cultivated as land forms, while moreover their habits were examined in water of different depths. With the exception of *C. lusitanica* all species mentioned above were caryologically investigated. As, especially in land-forms, the roots cannot be used for this type of examination, microscopic slides were made of the vegetation points of the stems, at the advice of Professor A. Fernandes. This method was very satisfactory. The vegetation tops were pretreated in a 0.05% solution of colchicine for at least one hour, then fixed in Navashin modification Bruun and stained in basic fuchsin, after which they were squashed. The slides were made permanent in Canada balsam.

The meiosis of *C. pedunculata* was also investigated. Young anthers were fixed in Carnoy and then squashed in aceto-carmine. As no divisions were found by fixations in the daytime, the anthers were repeatedly fixed at night. In the material fixed between 2 and 4 o'clock, some stages that could be used were found.

For herbarium investigation of the species we could make use of the following Portuguese collections:

Instituto Botânico da Universidade de Coimbra (COI)
Instituto Botânico da Universidade do Porto (PO)
Instituto Botânico da Universidade de Lisboa (LISU)
Estação Agronómica Nacional, Sacavém (LISE)
Instituto Superior de Agronomia, Lisboa (LISI)
Estação de Melhoramento de Plantas, Elvas (ELVE).

Moreover some other European collections were consulted, in connection with the distribution of some species, and for comparative morphological investigations.

We may here mention the herbaria of Kew, Leiden, Wien (Naturhist. Mus., Botan. Inst.), Zagreb, Neuchâtel and Helsinki.

I wish to express my appreciation to the curators of these herbaria for the loan of specimens.

KEY TO THE SPECIES (1)

A. *Aquatic forms*

1a. All leaves ± linear 2
b. Upper leaves spathulate, commonly forming a well-marked rosette 4
2a. Fruit broader than long 3
b. Fruit ± orbicular or slightly longer than broad, sessile or sometimes stalked. Basal rests of the reflexed stigmata pressed close to the lateral sides of the fruit. Mericarps narrowly winged. Leaves parallel-sided.... ..... *C. pedunculata*
3a. Mericarps with very broad, conspicuous wings. Leaves transparent green, widest at base, tapering above to the tip..... *C. lusitanica*
b. Mericarps unwinged. Leaves transparent green, commonly slightly elliptical..... *C. «truncata»*
4a. Mericarps with rounded edges. Fruit elliptical, longer than broad, with very shallow median and lateral furrows. Pollen ellipsoidal. Rosette leaves rhomboid ..... *C. obtusangula*
b. Mericarps winged..... 5
5a. Fruit broader than long. Wing of the mericarps very broad and conspicuous, composed of polygonal cells. Lower leaves transparent green, widest at base, tapering above to the tip..... *C. lusitanica*
b. Fruit ± orbicular or slightly longer than broad. Wing of the mericarps with radial structure..... 6

(1) Only reliable for well developed, flowering and fruiting plants.

6a. Rosette leaves broadly obovate or almost circular. Lower leaves broadly elliptical. Mericarps broadly winged. Stigmata spreading. Pollen yellow..... *C. stagnalis*

b. Rosette leaves narrowly spathulate. Lower leaves linear, parallel-sided. Stigmata reflexed at base; rests pressed close to the lateral sides of the fruit. Pollen colourless ..... *C. pedunculata*

B. ***Terrestrial forms***

1a. Fruit sessile..... 2

b. Fruit stalked, almost orbicular or slightly longer than broad. Stigmata reflexed at the base. Pollen colourless ..... *C. pedunculata*

2a. Fruit longer than broad. Mericarps with rounded edges. Stigmata erect or spreading. Pollen yellow, ellipsoidal ..... *C. obtusangula*

b. Fruit orbicular. Mericarps broadly winged. Stigmata recurved. Pollen yellow, globular..... *C. stagnalis*

Callitriche obtusangula Legall
(Map of the Pl. I)

This species was first described for France, namely by Le Gall, in his «Flore du Morbihan» of 1852.

Callitriche obtusangula is an easily recognizable species, especially as water-form during the flowering season. The leaves of the floating rosettes are conspicuous by their rhombic form. The pollen grains are long ellipsoidal, sometimes a little recurved. The fruit, too, has a characteristic shape; it is ellipsoidal, with very shallow grooves; in side view, the height is greater than the width. The mericarps are, on the back, completely rounded and without wings. There is aerial pollination.

C. obtusangula had not yet been mentioned for Portugal. In 1959, we came upon it in a narrow stream beside the Rio Real near Fonte do Mouro in the surroundings of Óbidos, while it was found near Coimbra by Júlio de Matos a little later. However, there were some specimens in the Portuguese herbaria determinated as *C. verna* L., as well as *C. platycarpa* Kütz. that belong to *C. obtusangula*. For the time being,

however, the impression is that the species is not common in Portugal.

The general distribution areal comprises the Mediterranean and Atlantic coastal areas; moreover the species is also found in Central Europe. From the first-mentioned areas we saw — besides the Portuguese specimens — material from the north coast of Africa, from Greece, Yugoslavia, Italy, Sicily, Sardinia, Corsica, France, Great Britain and the Netherlands; it is possible that it is also found in the neighbouring north-western coastal area of Germany; we did not see it from Denmark, however.

The Central European part of the distribution areal comprises the surroundings of the Lake of Geneva (canton Valais and Geneva), the area of Danube and Isar (approximately to Isarmündt) and the Rhine valley; moreover we saw one specimen from Austria (Otz valley).

As to the ecology of the species it is remarkable that it occurs in the Netherlands mainly in brackish water; perhaps this is the case in a part of the European coastal areal. In Central Europe, however, *C. obtusangula* is a plant of brooks and branches of rivers.

The chromosome number of *C. obtusangula* is $2n = 10$. It is interesting that in this species, as is the case with *C. stagnalis*, intraspecific populations occur with different caryotypes (Schotsman, 1961). These differences were probably caused by reciprocal translocations, in some cases combined with loss of parts of chromosomes. Conclusive differences in morphological characteristics between the different populations could not yet be shown; it may very well be, however, that there is a connection between caryotype and ecology. However, these and other problems, which the discovery of the differing caryotypes has raised, still require a detailed examination. We may finally state here that the caryotype of plants collected near Óbidos shows resemblance to the caryotype of the Dutch brackish water populations in this respect that in both caryotypes all chromosomes have subterminal constrictions. They are clearly different from the caryotypes of the populations from Central Europe and Canterbury, in which chromosomes in the shape of a V with median constrictions occur.

We saw herbarium material from the following localities in Portugal (see Pl. I):

BEIRA LITORAL: Aveiro, VI-1881, *J. Henriques* s. n. (COI); arredores de Coimbra, Ameal, 8-IV-1932, *F. Sousa* s. n. (COI).

ALTO ALENTEJO: Castelo de Vide, Herdade do Seixo, nas águas da ribeira de Nisa, 23-VI-1959, *A. Fernandes et A. Rodrigues* 7004 (COI); Vendas Novas, Vale do Arneiro, V-1947, *A. Fernandes et F. Sousa* 2194 (COI).

Callitriche stagnalis Scopoli
(Map of the Pl. I)

Callitriche stagnalis was found by SCOPOLI in the surroundings of Trieste, and described by him as a new species in 1772, in the « Flora carniolica ».

In vegetative respect *C. stagnalis* is one of the least variable species of the section *Eucallitriche*. The leaves are broad-elliptic, in the rosettes, sometimes almost circular. So far as we have ascertained in cultivation tests, the species does not develop, either during the winter period, or in deep water, the narrow linear leaves that make the identification of other species in the same circumstances so difficult. Also as land-form it is mostly recognizable by its broad leaves. As with all species of *Callitriche*, however, the fruit shows the best determination characters. In side view it is almost circular; the mericarps have broad wings and, in comparison with other species, the colour is often conspicuously light. The pollen grains are spherical in shape; the stigmata of the water-forms are divergent, those of the land-forms are mostly recurved. There is aerial pollination.

In Portugal *C. stagnalis* is undoubtedly the most common species. As water-form we found it in pools and brooklets near Coimbra, Albufeira, and the surroundings of Covilhã and Castelo Branco. In the last-mentioned area it often grows in such abundance that — sometimes with *C. pedunculata* — it is eaten as salad. The land-forms were especially found on sand-banks, along banks, on mountain-paths and on silt in the lagoon of Albufeira. The environment conditions and the vegetation of these localities are widely different. This also

applies to the localities in other countries of Europe. On the one hand we can come upon *C. stagnalis* in the coastal areas, e. g. near river-mouths and in tidal areas where therefore it must be fairly tolerant of salt (Anglesey; Netherlands: de Biesbos), on the other hand we find it in wooded areas, and especially as land-forms on paths, in cart-tracks and trenches. In the latter case it often grows there together with *C. palustris* L.

C. stagnalis occurs in all countries of Europe, though it is often less frequent than in Portugal. In the Netherlands e. g. it is among the rather rare species.

As stated before when describing *C. obtusangula*, populations with widely different caryotypes also occur within *C. stagnalis*. Especially the Central European populations are very different in this respect from the Western European populations investigated up to this time. The chromosome number is the same in all populations, viz. $2n = 10$.

The Portuguese plants are all of a caryotype in which all chromosomes have a subterminal centromere. In certain populations we have established the existence of one pair of SAT-chromosomes. Differences in external morphogical characteristics between populations in and outside of Portugal were not found up to this time. We expect, however, that in this case, too, a relation between environment and caryotype is not improbable.

We saw herbarium material from the following localities in Portugal (see Pl. I).

MINHO: Ponte do Mouro, Rio do Mouro, VI-1885, *A. R. da Cunha* s. n. (LISU); Gondarem, VI-1885, *A. R. da Cunha* s. n. (LISU); Vila Nova de Cerveira, entre Bemposta e Campos, ao Couto, IV-1946, *M. da Silva* 644 (LISE); Vila Nova de Cerveira, pr. Nogueira, VI-1947, *M. da Silva* 1041 (LISE); Viana do Castelo, Rib. das Fontes, VI-1886, *A. R. da Cunha* s. n. (LISU); Braga pr. Rendufinho, V-1939, *W. Rothmaler et A. P. Silva* 15521 (LISE).

TRÁS-OS-MONTES E ALTO DOURO: Bragança, na estrada Mirandela-Bragança, 24-VI-1955, *A. Fernandes, J. Matos et A. Matos* 5473 (COI); pr. Vimioso, S. Martinho d'Angueira, VI-1888, *J. de Mariz* s. n. (COI); pr. Sanguinhedo, na estrada

Vila Real-Bragança, 23-VI-1955, *A. Fernandes, J. Matos et A. Matos* 5409 (COI); Vila Real, Mateus, Mata do Conde, VI-1942, *G. Barbosa, et M. Myre* 4494 (LISI).

DOURO LITORAL: Valbom, VII-1878, *M. Ferreira* s. n. (COI); Porto, 1879, *F. Newton* s. n. (COI); Areinho de Avintes, V-1912, *A. Ricardo Jorge* s. n. (LISU); Areinho, s. d., *Gonçalo Sampaio* s. n. (PO); Linha férrea da Póvoa do Varzim, entre a Senhora da Hora e Custóias, V-1912, *A. Ricardo Jorge* s. n. (LISU); Gondomar, Rio Tinto, IV-1943, *J. Lebois Fonseca* s. n. (LISU); Espinho, 3-VII-1946, *P. Silva, Fontes, Myre et Rainha* 1498 (COI; LISE).

BEIRA ALTA: Celorico, rib. de Vilhagre, VI-1884, *A. R. da Cunha* s. n. (LISU); Oliveira do Hospital, S. Paio de Gramaços, 16-VI-1954, *J. Matos, A. Matos et A. Marques* 5020 (COI; ELVE).

BEIRA LITORAL: Buçaco, VI-1883, *F. Loureiro* s. n. (COI); Ourentã, III-1865, *A. de Carvalho* 278 (COI); Coimbra, Porto dos Bentos, IV-1904, *M. Ferreira* 1740 (COI), s. n. (LISU; PO); Coimbra, Porto dos Bentos, IV-1904, *J. G. de Barros e Cunha* s. n. (COI; LISI; LISU); Coimbra, Loreto, VI-1876, *J. Henriques* s. n. (COI); Coimbra, ribeira de Coselhas, IV-1890, *A. Moller* 864 (COI); Coimbra, Baleia, IV-1891, *J. A. d'Araújo e Castro* 1422 (COI; LISI; LISU); Coimbra, Baleia, IV-1891, *A. Moller* 1022 (COI; LISI); Coimbra, Vila Franca, V-1936, *W. Rothmaler* 11919 (LISE); Coimbra, Maínça, V-1948, *J. Matos* s. n. (ELVE).

BEIRA BAIXA: Covilhã, rib. de S. Domingos, VI-VII-1881, *A. R. da Cunha* s. n. (LISU); Castelo Branco, rio Ponsul, VI-1881, *A. R. da Cunha* s. n. (LISU); entre o cruzamento para Lentiscais, na estrada para Malpica, VI-1956, *A. Fernandes, J. Matos et A. Santos* 5909 (COI).

ESTREMADURA: inter Póvoa et Loures, V, *Welwitsch* s. n. (LISU); pr. Póvoa, V-1845, *Welwitsch* s. n. (LISU); Sintra, Quinta da Regadeira, III-1840, *Valorado?* s. n. (COI); rib. de Colares, III-1882, *J. Daveau* s. n. (LISU); Lisboa, Benfica, IV-1889, *J. Daveau* 1643 (COI), s. n. (LISI; LISU; PO); Lisboa, entre a Portela da Ajuda e Linda-a-Velha, III-1881, *A. X. Pereira Coutinho* 426 (LISU); Cascais, IX-1889, *A. X. Pereira Coutinho* 427 (LISU); pr. Cascais, III-IX-1894, *A. X. Pereira Coutinho* 1532 (COI; LISI), s. n. (LISU; PO); pr. Estoril, IV-1913, *A. X. Pereira Coutinho* 2895 (LISU); Alcochete, V-1885, *A. X. Pereira Coutinho*

428 p. p. (LISU); Moita *(marais)*, IV-1880, *J. Daveau* 709 (LISU); Arrentela, rio Judeu, V-1881, *A. R. da Cunha* s. n. (LISU); Setúbal pr. Marateca, V-1951, *F. Fontes et B. Rainha* 4184 (LISE); Setúbal, pântanos de Pontes, XII-1900, *Gonçalo Sampaio* s. n. (PO); pr. Apostiça, tr. Tangum, V, *Welwitsch* s. n. (LISU); Sesimbra, Apostiça, IV-1943, *G. Pedro, F. Malha et M. Silva* s. n. (LISE); inter Corroios et Sesimbra, IV-V-1885, *J. Daveau* s. n. (LISU).

ALTO ALENTEJO: p. Nisa, VI-1913, *M. Ferreira* s. n. (COI); Póvoa e Meadas, rib. de S. João, VI-1882, *A. R. da Cunha* s. n. (LISU); Castelo de Vide, pr. estrada para Portalegre, III-1954, *Malato-Beliz* 309 (LISI); Portalegre, rib. de Nisa, VI-1882, *A. R. da Cunha* s. n. (LISU); Elvas, Varche, Quinta de S.ta Rita, 25-IV-1953, *J. Guerra et A. Raimundo* 29 (ELVE; LISE; LISI; LISU); Vila Viçosa, Tapada Real, Águas Férreas, 4-V-1947, *A. Fernandes et F. Sousa* 1448 (COI); Serra de Ossa, estrada para Évora-Monte, III-1954 (ELVE); Mora, V-1914, *R. Palhinha et F. Mendes* s. n. (LISU); Vendas Novas, Vale de Águias 13-V--1947, *A. Fernandes et F. Sousa* 2223 (COI); Montemor-o-Novo, IV-1845, *Welwitsch* s. n. (LISU).

BAIXO ALENTEJO: Alcácer do Sal, Herdade de Palma, viveiro de arroz da Lagoa, IV-1959, *J. C. Vasconcellos* s. n. (LISI); Beja, rib. dos Frades, VI-1881, *A. R. da Cunha* s. n. (LISU); Serpa, Barranco das Águas Livres, IV-1882, *C. de Ficalho et J. Daveau* s. n. (LISU).

ALGARVE: inter Monchique et Banhos, VI-1847, *Welwitsch* s. n. (LISU); de Silves a Monchique, IV-1912, *R. Palhinha, R. Jorge et F. Mendes* s. n. (LISU); S. Brás de Alportel, pr. Bicalto, V-1947, *P. Silva, Fontes, Myre et Rainha* 1900 (LISE); Faro, V-1847, *Welwitsch* 417 (LISU).

Callitriche lusitanica Schotsm. nov. spec.
(fig. 1, 2, 3; cf. fig. 4; map of the Pl. II)

In 1952 an article was published by MENDES in «Agronomia Lusitana» about the occurrence of *C. autumnalis* L. (*C. hermaphroditica* Jusl.) in Portugal. This species had already been mentioned for Portugal by earlier authors, namely by BROTERO (Fl. Lus., 1804) and SAMPAIO (Fl. portuguesa 1947). MENDES

has the impression, however, that both authors have mistaken other species for *C. autumnalis.* According to him, Brotero had probably meant *C. truncata,* because of his definition « ... caps. pedunculata », while the nomenclature and discussion of Sampaio are very confused. Mendes rightly calls the nomenclature of this author untenable, as according to him the sections *Eucallitriche* and *Pseudocallitriche* are here mixed up.

In 1952 Mendes himself found some *Callitriche* specimens in Lagoa da Mó, which, with the help of Beger (1925) and Glück (1936), he identified as *C. autumnalis* L. em. Wahlenberg (in accordance with Samuelsson's nomenclature). On the strength of this find he also gave the name of *C. autumnalis* to some herbarium-plants which had been considered other species before (see Mendes pp. 54 ff).

During our investigations of the plants identified by Mendes as *C. autumnalis* (*C. hermaphroditica*), however, it was especially the shape of the fruit that raised doubts of the correctness of his view (1). In the first place there appeared to be a considerable difference in the width of the wing, between the fruits of plants from Lagoa da Mó and from other Portuguese localities, mentioned by Mendes. The former have narrow wings, the latter have conspicuously broad wings. However, this might perhaps be ascribed to an unripeness of the fruits with narrow wings. The fruits with broad wings, however, differed widely in form and cell structure from material that we knew from Northern Europe, but habit, and form of leaves, agreed with the northern material. On the strength of the fact that there exist widely different sizes of fruits and forms of wings among the northern exsiccated specimens, too, we were at first inclined to consider the Portuguese plants nevertheless *C. hermaphroditica,* while then perhaps later subspecies of it might be distinguished on the different shape of the fruits.

Apart from these plants, however, we came upon some very enigmatic plants in the Portuguese herbaria. The form of the fruit agreed with that of the specimens with broad wings

(1) Rosette Fernandes (in Bol. Soc. Brot. **30**: 132, 1956) has also raised doubts about the identification by Mendes of the Torrão specimen as *C. autumnalis.*

Fig. 1. — Mericarp of *Callitriche lusitanica* Schotsm. (Castelo Branco, LISU). For explanation see page 108.

Photo Dr. WACHTERS (Univ. Photo Service, Groningen, Neth.) × 93.

referred to above; the lower leaves had the typical « hermaphroditica»-form, but the stems ended in rosettes of spathulate leaves. Such rosettes do not occur in the northern *C. hermaphroditica*-plants, and do not occur either in related taxa from the section *Pseudocallitriche;* they are only to be found in the species from the section *Eucallitriche,* so in *C. stagnalis, C. obtusangula, C. platycarpa,* etc. In several other European collections, consulted in 1959, these plants were not found, and descriptions in the literature have not come to our notice up to this moment. From a careful comparative investigation in 1960, at which Professor A. Fernandes was so kind as to put once more herbarium material at my disposal, evidence was gained that the rosette bearing plants represent a new species. A description under the name of *Callitriche lusitanica* may follow here. As type specimen we chose the material collected in Castelo Branco, from the herbarium LISU (1885), in Lisbon, in which all the characteristics are clearly represented.

Unfortunately we have not succeeded in finding the species again in the surroundings of the locality mentioned above (1). Yet it will be of great importance to trace the species alive, so that life cycle, caryology and morphology, may be fully investigated. Especially the caryology of this species may give us important indications about the evolution in the *Callitriche* genus. For in our opinion *C. lusitanica* occupies a very special place, as on the one hand it possesses characteristics of *C. hermaphroditica* (section *Pseudocallitriche*), but on the other hand it has some qualities in common with species from the section *Eucallitriche.* We will go more fully into these resemblances and differences with the species from both sections.

C. lusitanica resembles *C. hermaphroditica* by the habit and the shape of the stem leaves. Those leaves are green, transparent, almost linear, but at the base wider than at the top. Glands and stomata are lacking. In certain circumstances, however — probably mainly during the flowering period — *C. lusitanica* develops rosettes of spathulate leaves at the top

(1) Since the above was written I received further specimens of this species, collected by Prof. A. Fernandes and his collaborators in 1959. They have been included in the list of localities.

of the stems (fig. 3). As was remarked above, development of rosettes does not take place in *C. hermaphroditica;* it is a feature of the species belonging to the section *Eucallitriche.* The rosette leaves of *C. lusitanica* still have at their base something

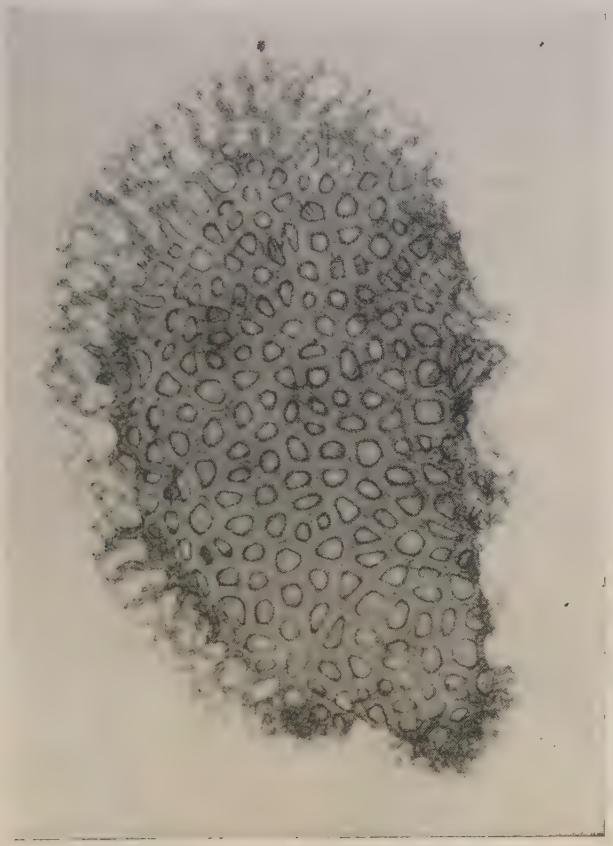


Fig. 2. — Mericarp of *Callitriche lusitanica* Schotsm. (Lagoa da Mó). Fruit narrowly winged. For explanation see page 110.
Photo Dr. WACHTERS (Univ. Photo Service, Groningen, Neth.) ×78.

of the transparency of the *C. hermaphroditica*-leaves, but the top has a different structure and bears glands and stomata. From the existence of these stomata it may be inferred that the rosettes probably float at the surface of the water. Further characteristics are as follows: just as *C. hermaphroditica*, the

flowers of *C. lusitanica* have no prophylla. The anthers, when young, are upright, after dehiscence recurved, resembling those of *C. platycarpa*, *C. obtusangula* and *C. stagnalis*. The pollen, however, is colourless, as in *C. hermaphroditica*. The pollination may be probably submerged.

Fig. 3. — Stem of *Callitriche lusitanica* Schotsm. (Castelo Branco, LISU). Lower leaves tapering to the top, uppermost spathulate. See page 107.

Photo Univ. Photo Service (Groningen, Neth.).

The structure of the fruits of *C. lusitanica* is basically the same as that of *C. hermaphroditica;* shape and size of the cells are different, however, especially in the wings (cf. fig. 1, 4).

The stem sometimes bears multicellular glands, especially near the top. These glands differ from the glands of other *Callitriche*-species known up to now.

Not all specimens in Portuguese herbaria have well developed rosettes; there are also some plants where the flowers and the fruits are absent. Then they closely resemble *C. hermaphroditica*.

That Mendes identified sterile specimens as *C. hermaphroditica* has become understandable from this, though it remains peculiar, however, that Mendes, when comparing the fruit-bearing Portuguese plants with foreign *C. hermaphroditica*-material (see his enumeration of the exsiccata on p. 52) was not struck by the difference in the shape of the fruits. Moreover, in his description he calls the fruit of *C. hermaphroditica* «largamente alado»,

Fig. 4. — Mericarp of *Callitriche hermaphroditica* L. (Warmond, Netherl.).
For explanation see page 108.
Photo Dr. WACHTERS (Univ. Photo Service, Groningen, Neth.) ×103.

but exactly the specimens he collected in Lagoa da Mó do not meet this criterion. The photograph (material from Lagoa da Mó?) does show — though not clearly — narrow wings. It is likely that in his identification MENDES has especially relied on the shape of the leaves.

Because of the forms of their fruits some of the plants identified by MENDES as *C. hermaphroditica* — also when they do not have rosettes — undoubtedly do belong to *C. lusitanica*. As to the sterile specimens we will not deny the possibility that they might belong to *C. hermaphroditica*. The occurrence of this species in Portugal, however, seems to us very improbable, also because of the much more northern distribution areal. The areal of *C. lusitanica* is restricted — so far as we known — to the Iberian peninsula (see the survey of the herbarium specimens on p. 111 and the distribution map of the Pl. II).

For the time being we have not subdivided the species *C. lusitanica* and so we have not further named the specimens with the narrow-winged fruits from Lagoa da Mó (fig. 2). Before distinguishing these plants e. g. as a variety, we should like to have more material at our disposal, in order to see whether this narrow wing — with its twisted cell structure — is merely incidental, or whether this is a constant feature of these plants.

Callitriche lusitanica Schotsm. nov. sp.

Herba, probabiliter solum in forma aquatica occurans, in anthesin rosulis foliorum natantibus praedita; caulis glandulosus. Folia inferiora sublinearia, ad basin latiora, apicem versus attenuata, pellucida, uninervata, eglandulosa, rosularum spathulata, apice rotundo vel subacuminato, praesertim parte latiori utrimque glandulosa, nervis lateralibus interdum ramosis utrimque 1 vel 2. Flores ebracteati; antherarum filamenta 1-3 mm longa, erecta, nonnunquam postea demissa; pollinis grana fere globosa, incolorata; stigmata fere quinquies longiora quam ovaria, initio patentia vel horizontaliter extensa, post foecundationem plerumque declinata. Fructus sessilis vel breviter pedicellatus, a latere visus late ellipsoideus, 1.8-2-2 mm latus, 1-1.4 mm altus, vestigiis stigmatis deficientibus; mericarpia subsemiglobosa, ala lata pellucida ornata.

Affinis *C. hermaphroditicae* a qua foliis superioribus rosulatis interdum lateraliter 1-2 nervatis, aliis mericarporum etc. differt.

We saw herbarium material of the following localities in Portugal:

BEIRA ALTA: Castelo Mendo, Moita do Carvalho, VII-1884, *A. R. da Cunha* s. n. (LISU); Almeida, Vale de Marcos, VII-1884, *A. R. da Cunha* s. n. (LISU); Almeida, VII-1890, *M. Ferreira* s. n. (COI); Vilar Formoso, rib. de Touvões, VI-1890, *M. Ferreira* s. n. (COI); Vilar Formoso, Moinho Novo, VI-1884, *A. R. da Cunha* s. n. (LISU); Celorico, rib. de Santo António, VI-1884, *A. R. da Cunha* s. n. (LISU).

BEIRA BAIXA: Covilhã, rib. Velha, VI-VII-1881, *A. R. da Cunha* s. n. (LISU); Castelo Branco, rib. Ponsul, VI-1881, *A. R. da Cunha* s. n. (LISU, holotypus); Idanha-a-Nova, rio Ponsul, VII-1883, *A. R. da Cunha* s. n. (LISU); estrada de Castelo Branco-Salgueiro, nas águas da ribeira Líria (submersa), 20-VI-1959, *A. Fernandes, J. Matos et A. Sarmento* 6841 (COI); estrada de Castelo Branco-Salgueiro, nas areias do leito da ribeira Líria, 20-VI-1959, *A. Fernandes, J. Matos et A. Sarmento* 6840 (COI); num ribeiro perto da ribeira de Ocreza, flutuando na água, 20-VI-1959, *A. Fernandes, J. Matos et A. Sarmento* 6856 (COI).

ALTO ALENTEJO: Portalegre, ribeira de Nisa, VI-1882, *A. R. da Cunha* s. n. (LISU); Portalegre, ribeira de Nisa, 20-VI-1908. *Gonçalo Sampaio* s. n. (PO); rib. da Fadagosa ao Sever, V-1913, *R. Palhinha et F. Mendes* s. n. (LISU); Póvoa e Meadas, rib. de Vide, VI-VII-1883, *A. R. da Cunha* s. n. (LISU); Castelo de Vide, nas águas da ribeira de Nisa, 23-VI-1959, *A. Fernandes et A. Rodrigues* 7006 (COI); Castelo de Vide, Herdade do Seixo, nas águas da ribeira de Nisa, 23-VI-1959, *A. Fernandes et A. Rodrigues* 7005 (COI).

BAIXO ALENTEJO: Torrão, III-1899, *Gonçalo Sampaio* s. n. (PO); Castro Verde, na Lagoa da Mó, II-1952, *E. J. Mendes* s. n. (COI; LISE; LISI; LISU; PO).

Callitriche pedunculata DC.
(fig. 5A, 6a, b; map of the Pl. II)

C. pedunculata was described in 1815 by De Candolle, who drew particular attention to the long-stalked fruits. From the description of later authors it appeared that *C. pedunculata* has characteristics in common with *C. hamulata* Kütz., so that the

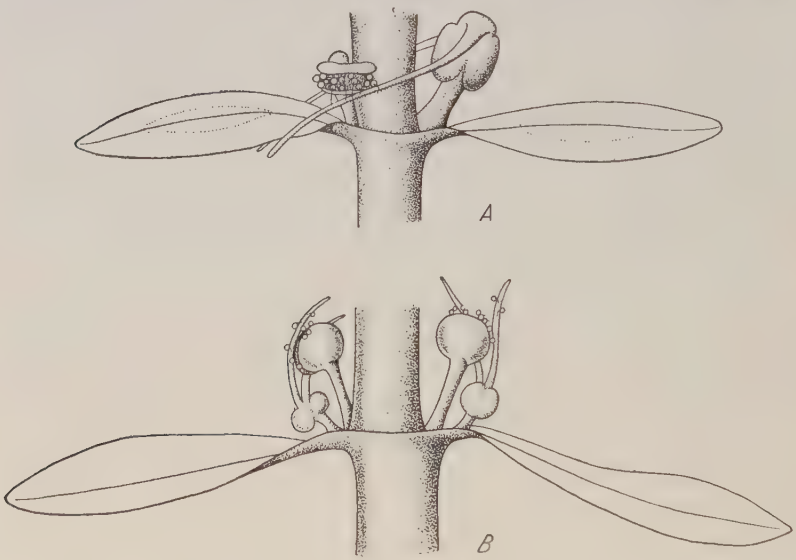


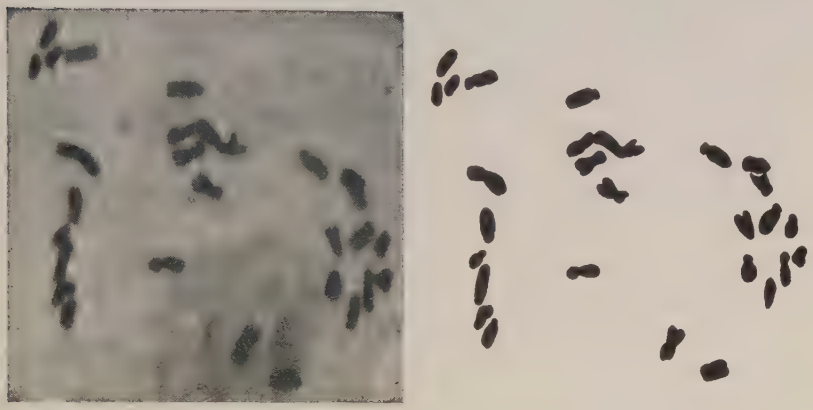
Fig. 5. — A. Pollination of *Callitriche pedunculata* DC. In the left leaf-axil the male flower after dehiscence, in the right one the female flower. See page 115.
B. Pollination of *Callitriche deflexa* A. Br. A male and a female flower together in one leaf-axil. Prophylla absent. See page 122.

former was sometimes considered a variety of *C. hamulata* or, both, as subspecies of a single species. Herbarium investigations proved indeed that the line between *C. pedunculata* and *C. hamulata* is not always easy to draw, especially in the case of land and transitional forms.

In 1959/1960 we investigated in more detail the taxonomy of the two taxa.

In Portugal we found in the surroundings of Coimbra numerous land-forms with long-stalked fruits, which, partly on

account of this characteristic, had to be conceived as *C. pedunculata*. In «poços» and small pools in the surroundings of Castelo Branco and Covilhã, on the other hand, we came upon fine water-forms with sessile fruits and small floating rosettes, which — except for their slight habit — reminded us strongly of *C. hamulata*. These specimens were pratically identical to exsiccata that Rosette Fernandes also identified as *C. hamulata*. On the strength of these herbarium specimens she confirmed



a b

Fig. 6. — *Callitriche pedunculata* DC.

a. Mitotic metaphase with 2n = 28 chromosomes.
b. Explanatory diagram of a.

Photo Sarmento (Coimbra).

the existence of *C. hamulata* in Portugal in her «Notas» (in Bol. Soc. Brot. sér. 2, **30**: 132, 1956), species which Sampaio had indicated early. As the result of a further examination by the present author the following facts became evident. The land-forms of *C. pedunculata* from Coimbra, when immersed in water of a depth of about 20 cm., developed into slight water-forms with sessile fruits, whereas the specimens collected as water-forms, when cultivated further in moist soil, developed into land-forms with stalked fruits. It appeared, moreover, that both the Coimbra specimens and the specimens from the east of Portugal had the same number of chromosomes, namely 2n = 28 (fig. 6), in contrast with the *C. hamulata*-specimens

examined by us (originating from Wales, Canterbury the Netherlands, the area of the Vosges, Ratisbon and Western Switzerland), which have $2n = 38$ chromosomes.

From these data we may draw the conclusion that all the specimens collected alive from the Portuguese habitats mentioned before, must be considered to belong to *C. pedunculata,* and that the occurence of *C. hamulata* in these habitats is doubtful. It is possible, however, that it may be found elsewhere in the country. An extensive investigation will be necessary, however, at which we shall have to rely especially on caryological examinations and cultivation experiments, as up to now we have not found any morphological characteristics that could be made use of in herbaria to separate convincingly the two taxa in all their habits. For there are many similarities in these characteristics. Not only has *C. pedunculata* as water form often sessile fruits, like *C. hamulata,* as already noticed, but *C. hamulata,* as land-form, may also develop stalked fruits under certain conditions (Schotsman, 1954), which makes identification of dried specimens extremely difficult. Besides, the general structure of the flower, the pollination and the shape of the stem glands is practically identical.

Some points of difference between the two taxa may be pointed out, however, one of the most important of which is the difference in chromosome number mentioned before. Another point of difference concerns ecological factors. *C. hamulata* is a plant growing in running, oligotrophic water; sometimes it is also found in mountain-lakes (Wales). As we showed elsewhere (Schotsman, 1954), the impression is given that it avoids areas which are rich in lime.

On the other hand we have always come upon *C. pedunculata,* as water-form, — at least in Portugal — in small water-reservoirs with stagnant, clear water that is not too deep. By its delicate habit is has probably no resistance to a strong current of water. It is likely that *C. pedunculata,* as contrasted with *C. hamulata,* is found in Portugal both on calcareous soils and on granite.

We assume that there are also differences in the life cycles. *C. pedunculata* may be supposed to be annual, as the land forms die down in early summer; it is likely that the «poços»

with water-forms also may dry up during this period. *C. hamulata*, however, is mostly perennial.

The geographical distribution of the two taxa ought to be investigated in detail. Broadly speaking, a mainly Mediterranean-Atlantic areal is probable for *C. pedunculata;* the details, however, are especially in Western Europe, by no means certain as yet. *C. hamulata* occurs in Western Europe, to the east at any rate as far as Bohemia, possibly as far as Poland. It is not recorded from Russia. Except from Northern Italy, we did not see any undoubted specimens of *C. hamulata* from the Mediterranean area, Yugoslavia and Portugal. The two areas may therefore be supposed to be partly separated, but they overlap in Western Europe.

We may wonder if the points of difference mentioned above are important enough to consider *C. hamulata* and *C. pedunculata* separate species. For the time being we consider that this is so indeed, though the two are undoubtedly closely related.

A close comparison of the caryotypes and examination of the possibilities of hybridization may shed more light on this question. The chance to come across wild hybrids is very slight, however, for the structure of the flower points to self-pollination, while the differences in environment conditions of their habitats do not make it probable that *C. pedunculata* and *C. hamulata* actually meet, nor even where they are sympatric. We intend to try out, however, whether artificial hybridisation is possible.

So the last word about *C. hamulata* and *C. pedunculata* has not yet been said, the more so as we have found specimens with deviations in the shape of the fruits, in the herbarium marerial of Western Europe. Moreover, in Iceland, Löve and Löve (1856) found, in plants which they considered to be *C. pedunculata* and *C. hamulata,* chromosome numbers that deviate from those of the material investigated by us, for they counted respectively $2n = 20$ and $2n = 40$ chromosomes.

Finally we should like to add a few words on the pollination, and mention some characteristics by which *C. pedunculata* differs from other Portuguese species. As to the pollination, the following remarks may be made: there is mostly a male flower

in one leaf-axil of a pair of leaves, a female flower in the other one. The latter consists of an ovary with 2 transversal, threadlike stigmata, curved backwards. The male flower consists of one stamen. This stamen is curved towards one of the stigmata, so that the anther almost touches this. After dehiscence, — which takes place only below the water level or in a water-drop —, a great portion of the very thin-walled colourless pollengrains stick together and remain in the anther. In the water they soon germinate and the pollen tubes easily reach the near stigma. By the lengthening of their fruit-stalks the ripening fruits of land forms often penetrate into the soil. Because of these stalked fruits *C. pedunculata* bears also some resemblance to *C. deflexa*. Its fruit is bigger, however, and in side view it is about circular. The rests of the style are turned back at the very base and are pressed against the fruit. Besides, it bears a fruit in only one of the two leaf-axils of a pair of leaves. *C. deflexa*, on the other hand, by a different distribution of the male and female flowers (see fig. 5 B, p. 112) bears a fruit in both the leaf-axils of a pair of leaves. This fruit is, moreover, smaller than that of *C. pedunculata*, and clearly broader than high. By the structure of the flowers, the pollination, the very thin-walled and colourless pollen grains, and the fruits with the rest of the style turned back, *C. pedunculata* can easily be distinguished from *C. stagnalis* and *C. obtusangula*. Moreover the latter species have 8-celled stem glands, whereas the glands of *C. pedunculata* consist of 12-15 cells.

We saw herbarium material from the following localities in Portugal (see map of the Pl. II) (1).

TRÁS-OS-MONTES E ALTO DOURO: estrada de Macedo de Cavaleiros a Bragança, VI-1958, *A. Fernandes, R. Fernandes, J. Matos et A. Marques* 6290 (COI).

DOURO LITORAL: pr. Porto, Lavadores, III-1900, *Gonçalo Sampaio* s. n. (PO); Porto, margens do Douro, s. d., *Gonçalo Sampaio* s. n. (PO).

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(1) Specimens of all localities up to 1956 were already verified and referred by ROSETTE FERNANDES (in Bol. Soc. Brot. sér. 2, **30**: 132, 1956).

Doubtful specimens, mostly aquatic forms with sessile fruits, are cited below as *Callitriche pedunculata* DC. or *Callitriche hamulata* Kütz.

BEIRA LITORAL: Coimbra, pr. Vila Franca, V-1936, *W. Rothmaler* 11918 (LISE); Coimbra, Q.ta das Varandas, IV-1939, *A. Cabral* s. n. (COI); Coimbra, Choupal, V-1948, *J. Matos* 2324 (COI).

BEIRA BAIXA: Castelo Branco, pr. Alcaíns, VI-1938, *W. Rothmaler* 13642 (LISE); estrada de Castelo Branco-Salgueiro, nas águas da ribeira Líria, 20-VI-1959, *A. Fernandes, J. Matos et A. Sarmento* 6839 (COI).

ESTREMADURA: Mafra, lagoa mais oriental da Tapada, V-1954, *E. J. Mendes* s. n. (LISU); pr. Lisboa, charcos de Frielas, III-1882, *Daveau* s. n. (LISU); pr. Lisboa, charcos de Frielas, V-VI-1884, *J. Daveau* 1048 (COI; LISU); Alcochete, V-1885, *A. Pereira Coutinho* 428 p. p. (LISU); Moita, III-1881, *A. R. da Cunha* s. n. (LISU); inter As Vendas et Moita, tr. Tagum, III-1842, *Welwitsch* s. n. (LISU); Pegões, II-1956, *F. Fontes* MC3 (LISE); inter Azeitão et Calhariz, V-1845, *Welwitsch* s. n. (LISU).

BAIXO ALENTEJO: Odemira, Pego das Pias, IV-1905, *G. Sampaio* s. n. (PO); Odemira, IV-1905, *G. Sampaio* s. n. (PO).

C. pedunculata DC. or **C. hamulata** Kütz.

MINHO: Monção, VI-1885, *A. R. da Cunha* s. n. (LISU); Banhos de Monção, rio Minho, VI-1885, *A. R. da Cunha* s. n. (LISU); Torporiz, VI-1885, *A. R. da Cunha* s. n. (LISU); Valença, entre Gândara e Valença, IV-1946, *M. Silva* 601 (LISE).

TRÁS-OS-MONTES E ALTO DOURO: Vimioso, Quinta do Vale da Pena, pr. Pinelo, no chafariz, *Miranda Lopes* s. n. (COI).

DOURO LITORAL: pr. Porto, Valadares, 1879, *F. Newton* s. n. (COI); pr. Porto, Vila Nova de Gaia, Lavadores, 1895, *Gonçalo Sampaio* s. n. (PO).

BEIRA ALTA: Noemi, estrada Santa Cruz-Vela, pr. Guarda, VII-1950, *A. Fernandes et J. Matos* 3525 (COI).

BEIRA BAIXA: Fundão, IX-1945, *J. Vasconcellos* s. n. (LISI); Castelo Branco, rib. de Ponsul, VI-1881, *A. R. da Cunha* s. n. (LISU); Unhais da Serra, VIII-1955, *A. P. Silva et fil.* s. n. (LISE).

RIBATEJO: Tomar pr. Santa Cita, III-1939, *W. Rothmaler* 14594 (LISE).

ALTO ALENTEJO: Évora, versus Alcáçovas, II-1939, *W. Rothmaler et A. P. Silva* 14483 (LISE).

BAIXO ALENTEJO: Almodôvar, versus Castro Verde, II-1939, *W. Rothmaler et A. P. Silva* 14367 (LISE).

The Callitriche truncata-complex
(fig. 7, 8; map of the Pl. I)

In 1826 a new species of *Callitriche* was described by Gussone under the name of *C. truncata*. His description was based on specimens collected by him in Calabria (South Italy), and

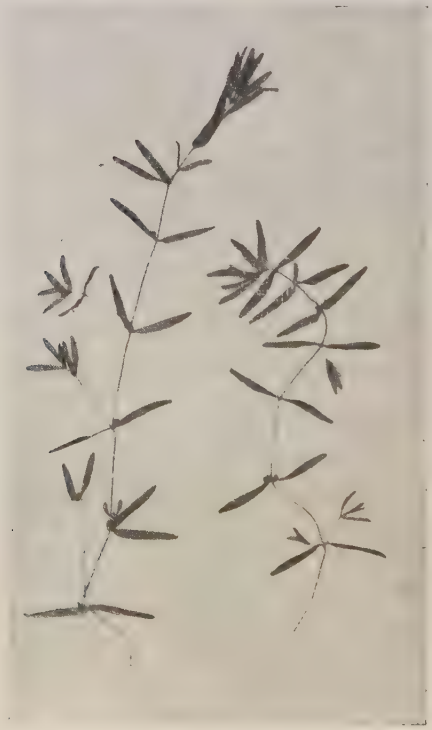

Fig. 7. — Stem of *Callitriche « truncata »* (Souselas).
For explanation see page 120.
Photo Univ. Photo Service (Groningen, Neth.).

mentions as one of the most important characteristics: «folia... apice truncata vel bidentata, pellucida». The fruit is stalked, and we find its form, somewhat schematically indicated, in Tab. II, fig. 2 (Plantae rariores); the width is clearly greater than the height. Almost all authors after Gussone have classified those *Callitriche* specimens from Western Europe and

Fig. 8.— Mericarp of *Callitriche « truncata »* (Souselas). For explanation see pag. 120.
Photo Dr. WACHTERS (Univ. Photo Service, Groningen, Neth.) × 101.

the Mediterranean area that showed the above-mentioned characteristics, as *C. truncata*.

A provisional comparative morphological investigation, however, disclosed that material from different localities — which would at first sight, by means of the characteristics mentioned above, be identified as *C. truncata* — show, to a greater or smaller degree, important mutual differences.

a. Material from Western Europe (Portugal, France, Belgium, Great Britain) — The plants from these countries show great morphological resemblance. The leaves are mostly somewhat elliptical (fig. 7), at the top emarginated in crescent shape. The fruits are short-stalked or sessile, broader than high. The mericarps are wingless. (fig. 8).

b. Material from Sardinia, Sicily and Krk (Yugoslavia) — The leaves are mostly widest at their base, tapering to the top, which brings to mind *C. hermaphroditica* L. The mericarps are winged, especially at summit. Some fruits (Sicily) are stalked.

c. Material from Creta — These plants were identified as *C. truncata* by Dörfler and collected by him during his travel through Creta. By their habit and transparent leaves they show indeed some affinity with the plants mentioned above. The female flower, the broadly winged fruits and the cell pattern of the mericarps, however, are quite different. It appears to be a very distinct species.

d. Material from Sarepta (Russia) — These plants, collected by Becker, deviate from a-c by the shape of the fruit.

It may have become apparent from the above survey that the taxonomy of « *C. truncata* Guss.» is much more complicacated than was assumed by previous authors. It will be necessary first to examine Gussone's original material from Calabria, for neither from his description nor from his picture can it be deduced whether his plants are identical with one of the

groups described under a-d, or whether they possess different characteristics.

The question whether there exist more or less profound genetic difference between the groups mentioned above must be left open for the time being. There are undoubtely interesting possibilities for further investigations.

As to the representatives of the *C. truncata*-complex in Portugal, the following remarks may be made:

The morphological characteristics are the same as those of the specimens from other West European countries investigated in herbarium collections. We collected living plants in Souselas, which fructified and flowered abundantly. The number of chromosomes of these plants was $2n = 6$; all chromosomes have a subterminal centromere. Darlington and Wylie (1955) mention the same number, counted by T. Dodds. They do not state the literature, however, in which this author has published his data, so that the locality and further details of his material are not known to us.

Besides the specimens from Souselas we saw herbarium material from the following localities (1):

DOURO LITORAL: pr. Porto, 1879, *F. Newton* s. n. (COI).

BEIRA LITORAL: Anadia, in aquis calcareis versus Famalicão, VII-1956, *P. Silva et B. Rainha* 5839 (LISE); Coimbra, Souselas, V-1953, *P.e M. Póvoa dos Reis* s. n. (COI).

RIBATEJO: Lezíria de Azambuja, Vala Velha, VII-1881, *A. R. da Cunha* s. n. (LISU).

ESTREMADURA: Lisboa, Av. Alferes Malheiros, Pote de Água, num charco, III-1952, *F. Fontes et B. Rainha* 5039 (ELVE; LISE).

Callitriche deflexa A. Br.
(fig. 5B)

Callitriche deflexa A. Br. is an American species, considered by Fassett (1951) to belong to the section *Microcallitriche*, a

(1) All the specimens of these localities (Anadia except) were also already identified and referred by Rosette Fernandes (*loc. cit.*: 133).

a non-European group, chiefly characterized by the fact that the prophylla are absent and that the plants are exclusively known as land-forms.

In some Spanish floras is recorded the var. *hispanica* Lange (*C. reflexa* Lange mscr. in herb. 1852) of *C. deflexa* A. Br., in Sierra Morena (La Carolina) and Sierra de Guadarrama. This variety is distinguished by Lange (Pugillus: 334, 1865) by the following characters: «Differt planta a me in Hispania observata a descriptione C. deflexae typicae *stylis* fugacissimis, *fructibus* majoribus (magnitudine fructum C. vernae, saltem non minimi dicendi), *pedunculis* 4-5 millimetr. longis valde deflexis et in limo nidulantibus». Lange says also: «In *C. pedunculata* DC., ceterum affini, fructus structura longe diversa est». Now in the Willkomm collection in the Coimbra herbarium there is a plant, collected in Guadarrama (Plantae ex Hispania 1851-1852) and identified as *C. reflexa* Lge. This specimen, however, belongs to *C. pedunculata*, as is apparent from the flowers and the shape of the fruit (fig. 5 A, B).

In the Coimbra Botanic Gardens *C. deflexa* appeared in pots with different species of *Narcissus* and *Ornithogalum*. The mould for these pot cultures came from the surroundings of Coimbra. We have not come upon the species wild, nor naturalized however.

We should like to mention here some observations, however, which we made in our Coimbra cultures.

As Fassett states, *C. deflexa* is only known as a land-form. Indeed we found in our cultures that, quite different from the European species from the section *Eucallitriche*, *C. deflexa* cannot develop a water-form. We cultivated the plants for some weeks in water of a depth of 10-15 cm, but neither rosettes nor linear leaves were developed. The growth was stagnant and the plants partially died off; after planting them out in moist soil they recovered.

The pollination of this species is interesting. In the period of flowering, several pairs of leaves of one stalk bear flowers. Each of these pairs of leaves has a male and a female flower in both the leaf-axils. The ovary has two threadlike stigmata, more or less erect, but slightly bent backwards. When the anther is ripe, it just touches these stigmata, so that, as soon

as the anther dehisces, the pollen grains touch the stigmata; they germinate after some time. After fertilization the fruit-stalks are extended and they drive the fruits into the soil, so that the young plants are tied to the ground not only by the roots, but also by their fruits. The stalks can reach a length of about 5 mm.

The chromosome number of the Coimbra Botanic Garden material is $2n = 10$; all chromosomes have a subterminal centromere. Satellites were not seen.

Because of the prostrate stems with elliptic leaves the species may at first sight be mistaken for *C. pedunculata*, which has also stalked fruits. *C. deflexa*, however, forms a fruit in both the leaf-axils of a pair of leaves, in contrast to *C. pedunculata*, with which always only one of the two leaf-axils of a pair of leaves bears a fruit. Besides, the fruits of *C. deflexa* are driven into the soil vertically, which is not the case to the same extent with *C. pedunculata*. Furthermore the shape of the fruit is characteristic, which excludes confusion with other European species: it is small, the width is much greater than the height, in side view it has about the shape of a pair of glasses. The mericarps have narrow wings.

ACKNOWLEDGEMENTS

I am highly indebted to Prof. Dr. A. Fernandes for his interest, the planning of excursions and his most valuable help. I am specially indebted to Mrs. Rosette Fernandes for his assistance in composing the lists of geographical distribution. I also wish to express my thanks to Prof. Dr. J. Barros Neves for his excursion to Sezimbra.

My thanks are due to Mr. Sarmento, and Dr. Wachters (Univ. Photo Service, Groningen, Neth.), who bestowed much care on the photographs, to Mr. Aníbal da Conceição Santos for his valuable help concerning karyological methods, to Mr. Júlio de Matos for his important assistance in gathering living material and to all other persons of the Botanical Institute for their help.

Finally I wish to thank Dr. J. Th. Koster (Leiden, Neth.) for the preparation of the latin diagnosis.

I am indebted to the Netherlands Organization for Pure Research (Z. W. O.) which offered me a grant enabling this study.

SUMMARY

Following *Callitriche* species occur in Portugal:

Callitriche stagnalis Scop. Very common. Chromosome number 2n = 10 (material from Coimbra, Castelo Branco, Covilhã, Albufeira).

Callitriche obtusangula Legall. Only in a few scattered localities. Chromosome number 2n = 10 (Fonte do Mouro).

Callitriche pedunculata DC. Land-forms common on moist soil; water-forms in small pools with stagnant, clear water (poços). Chromosome number 2n = 28 (plants from Coimbra, Castelo Branco, Covilhã). Closely related to *C. hamulata* Kütz. (chromosome number 2n = 38). This species, however, has not been seen from Portugal up to now with certitude.

Callitriche « truncata » Guss. In a few scattered localities. Chromosome number 2n = 6 (material from Souselas). It is desirable to make a division within this complex species.

Callitriche lusitanica Schotsm. Nov. sp.

Distribution area probably limited to the Iberian Peninsula. Number of chromosome still unknown.

In the Botanic Garden of Coimbra *Callitriche deflexa* A. Br. was found. This American species is probably introduced. Chromosome number 2n = 10.

The occurrence of some other European species e. g. *C. platycarpa* Kütz., *C. palustris* L. may be possible, but they have not been recorded in Portugal up to now.

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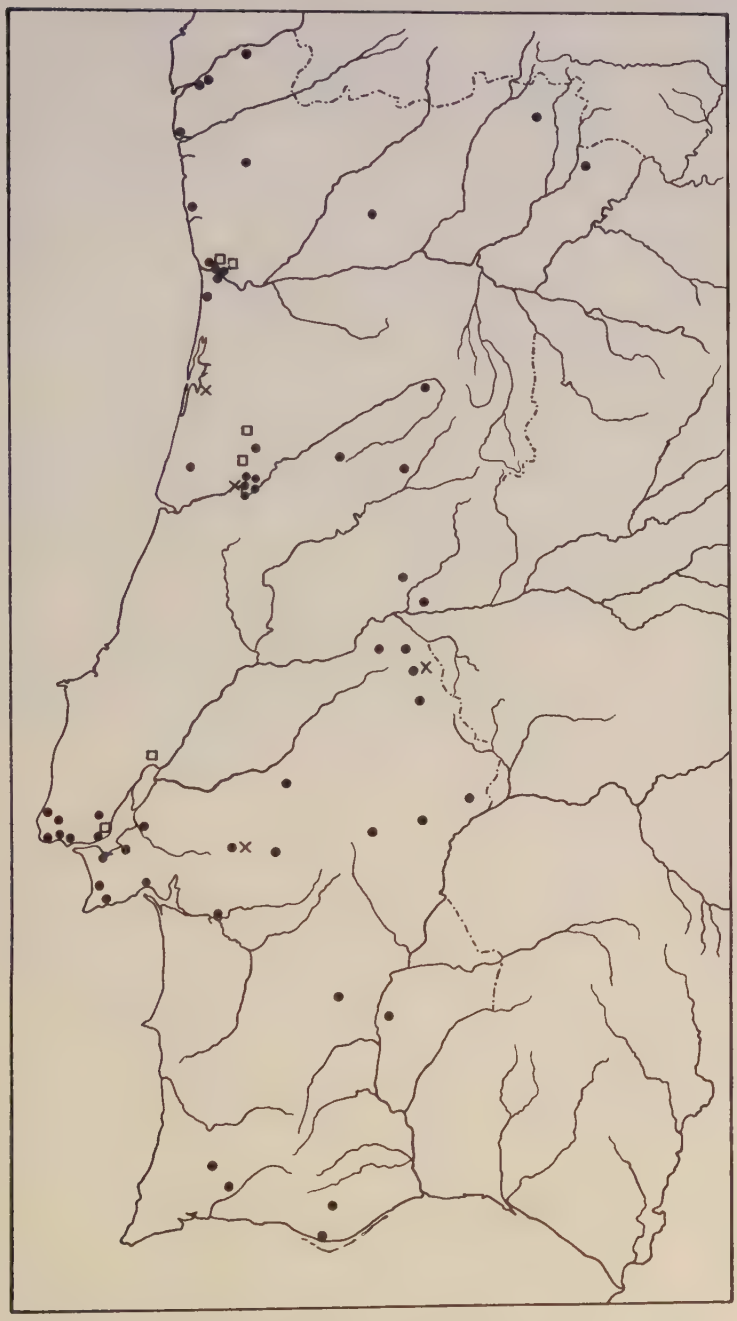
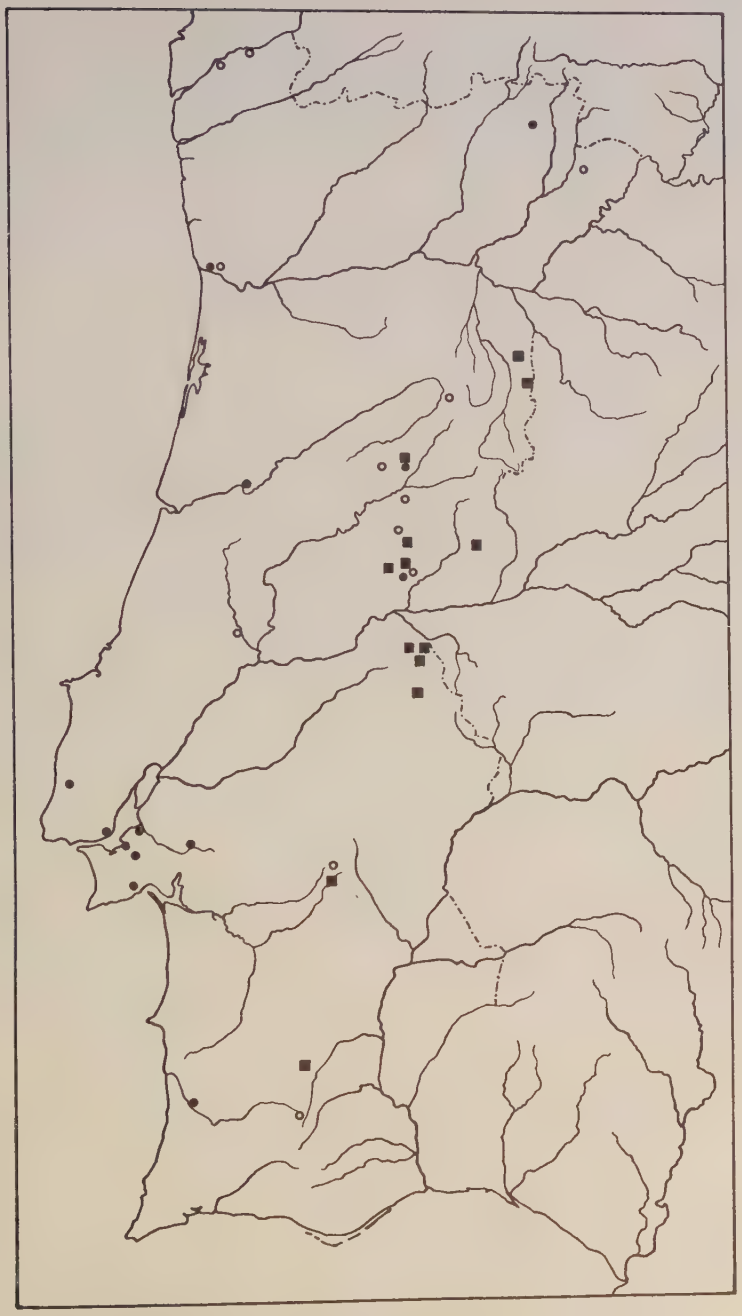


● *Callitriche stagnalis* Scop.
□ *Callitriche « truncata »* Guss.
✖ *Callitriche obtusangula* Le Gall.

For explanation see text.



● *Callitriche pedunculata* DC.
○ *Callitriche pedunculata* DC. or *Callitriche hamulata* Kütz.
■ *Callitriche lusitanica* Schotsm.

For explanation see text

CERASTIUM VOURINENSE MÖSCHL & RECHINGER SPECIES NOVA

W. MÖSCHL
Graz, Steiermark, Österreich

HERR Dr. K. H. RECHINGER, Vorstand der Botanischen Abteilung des Naturhistorischen Museums in WIEN I, Burgring 7, Österreich, unterstützt seit langem meine Studien der Gattung *Cerastium* durch Entlehnung von Literatur und Belegen. Er sandte mir auch stets die Cerastien, welche er auf seinen Forschungsreisen sammelte, zur Durchsicht. So erhielt ich von ihm am 2. Mai 1959 eine Sendung, die ein strephodontes *Cerastium* aus Griechenland enthielt. Am 26. Juni 1959 musste ich dem Finder mitteilen, dass ich dieses strephodonte *Cerastium* nicht bestimmen könne.

Ich danke hiermit Herrn Dr. K. H. RECHINGER für seine Geduld und für die Erlaubnis, dieses *Cerastium* als neue Art zu veröffentlichen. Zugleich möchte ich ihm herzlich für die reiche und liebenswürdige Hilfe danken, die er mir schon durch Jahrzehnte und stets rasch zu teil werden lässt.

Für Übersetzungen habe ich zu danken Frau Professor Dr. HILDEGARD BEER und Herrn Professor Dr. ERICH ETZLER in Graz.

Abkürzungen der zitierten Herbarien:

Mö = Herbarium des Dr. WILHELM MÖSCHL, GRAZ-III, Geidorfgürtel 46, Steiermark, Österreich (vor 1960: Bruck a. d. Mur).
W = Botanische Abteilung des Naturhistorischen Museums, WIEN-I, Burgring 7, Österreich.

Typus: «K. H. RECHINGER, Iter Graecum VIII., 1956. 17455. Cerastium. Macedonia occidentalis: Distr. Kozani, in monte Vourinon, in declivibus orientalibus, substr. serpent. in glarea torrentis, 1600 m. 5.-7.VII.»; MÖSCHL nr. rev. 10329: W.

Descriptio : Species annua, pilosa et glanduloso-pilosa, c. ad 18 cm alta (vel altior?). — Caules a basi glandulosissimi per pilos. Individua parva paucifloraque supra dimidium caulis in dichotomiam ramosa, sed individua robustiora multifloraque iam infra dimidium caulis in dichotomiam ramosa sunt. In bifurcationibus tertianis (vel secundis interdum) et in superioribus plerumque ramus unus dichotomiarum reductus in florem unum. — Pili uniseriati plerumque cellulis 4-5. Cellula summa pilorum eglandulosorum paulatim acuminata; cellula summa pilorum glanduliferorum plerumque ovoidea vel ± ellipsoidea, c. (0,03)-0,05-0,06-(0,07) mm longa. Pili eglandulosi (saepissime in foliis infimis) plerumque ad c. 0,3-0,4 mm, in petiolis foliarum ad 0,9 mm longi; pili glanduliferi ad 0,3 mm longi. — Folia infima spathulata (c. 5 × 11 mm); superiora sessilia, ± elliptica vel ovalia (c. 5×11 mm), semper glandulosa. — Bracteolae floris infimi (= bifurcationis infimae) utrimque pilosae et glandulosissimae, foliaceae nec scarioso-marginatae, c. ad 6-9 mm longae; bracteolae superiores omnes etiam foliaceae et glandulosissimae.—Pedicellus primarius fructifer semper calyce longior, c. 10-17 mm longus. Pedicelli pilis glanduliferis patentibus vestiti, post anthesin ad 90° refracti, sed maturi erecti. — Flores omnes pentameri. — Sepala 5, solum fere pilis glanduliferis vestita, c. 5-5,5 mm longa. Sepalum extremum sine apice hyalino; sepalum intimum marginibus (praecipue versus apicem) hyalinis latisque. — Petala 5, glabra, alba, paucinervia, sepalis paulo longiora, cuneiformia e basi angusta paulatim latescentia, breviter biloba (?; in typo apices petalorum contracti, sed evidenter petala non profunde incisa). — Stamina 10. Filamenta glabra, c. 2,5-2,8 mm longa. Antherae parvae, c. 0,3-0,4 mm longae. Granulum pollinis c. 0,03 mm in diametro. — Styli 5, glabri sicuti ovarium, in parte interiore supra dimidium papillosi, c. 1,4-2 mm longi. — Capsula matura erecta, numquam nutans, glabra, subcylindracea, subincurva, calyce interdum longior vel plerumque aequilonga, c. 5-7 mm longa et ad 2,5 mm lata in basi dentium (ad 2,8 mm in dimidio capsulae). Nervi 10. Dentes capsulae 10, typo « Strephodon », sicci spiraliter revoluti, evoluti in aqua c. 0,7-0,8 mm longi. — Paries capsulae maturae (c. 0,02--0,025 mm in diametro) sectione transversa in superiore parte capsulae in utroque latere unam seriem cellularum ostendit

(series externa c. 0,01-0,012 mm alta, series interna c. 0,006 mm alta), quarum paries exterior incrassatus est; pars media parietis capsulae 1 seriem cellularum ostendit, quarum parietes omnes tenuissimi sunt. Cellulae incrassatae epidermidis in dentibus ligneae vel lignefactae [reactione $C_6H_3(OH)_3 + HCl$ = «Phloroglucin + Salzsäure» rufescentes]. — Placenta matura bacillaris, c. 2,5 mm longa; funiculi omnes humiles etiam summi. — Semina chondrospermia, ± compressa, a latere visa ± oblonga vel trapezoidea, flavo-ferruginea, c. 0,9-1 mm longa. — Verrucae seminum diversae saepe in semine eodem: aliae cumuliformes vel tergiformes, ad 0,03-0,07 mm altae, aliae (solum in dorso seminis) cylindraceae ad 0,3 mm altae. Verrucae in circuitu rotundatae vel oblongae sunt. Verrucae totae granulis minutissimis et hyalinis dense tectae. Parietes inter verrucas irregulariter plicati et in angulis nodulis incrassatis ornati. — Species florifera et fructifera mense Julio.

Synonyma: Nulla.

Icones: Möschl in hoc opere: fig. 1-22.

Distributio: Circa 40° 10' N et 21° 40' E = Europa australis, peninsula Balcanica, Graecia: Macedonia occidentalis, mons Vourinon (= Vuronon = Mount Vourinos), situs in regionibus australibus urbis «Siatista (= Setischta)» in districtu Kozani (= Kožani = Kozane = Koshani = Koziani). — Species crescit sec. schedas «in declivibus orientalibus, substr. serpent. in saxosis umbrosis, 1850 m» et «substr. serpent., in glarea torrentis, 1600 m». Vide de flora montis Vourinon: Goulimis, To oros Boyrinos kai e chloris toy («To Boyno», Athenai 1960: 122-131). Rechinger: Plantae novae graeco-macedonicae, imprimis serpentinicolae (Anzeiger d. math.-naturw. Kl. d. Österr. Akad. d. Wiss., Wien 1957/2: 21-27).

Specimina visa: Macedonia occidentalis, Distr. Kozani, in monte Vourinon [Rechinger, Iter Graecum VIII, nr. 17432: Mö, W. — Rechinger, Iter Graecum VIII, nr. 17455: W = typus].

Die Art wurde im Einvernehmen mit dem Finder nach dem Fundort, dem Berg *Vourinon* benannt. Bei der Unzahl der gültigen und ungültigen Namen im Rahmen der Gattung *Cerastium* scheint es mir zweckmässig geographische Artnamen zu wählen, falls die Benennung nach einem kennzeichnenden

Merkmal nicht möglich ist. Namen von Personen als Artnamen zu verwenden, scheint mir sinnwidrig, da solche Namen nichts über die Merkmale und die Verbreitung der Art aussagen.

Cerastium vourinense ist eine einjährige Art der Sektion Strephodon Seringe in De Candolle, Prodr. I, 1824: 414: «Capsula cylindrica, dentibus circinnatis» (Mit diesem Hinweis will ich keine Stellung nehmen zu der Frage, ob diese Sektion eine natürliche Verwandtschaftsgruppe darstellt oder nicht).

C. vourinense kann nicht identisch sein mit dem *C. syvaschicum* Kleopov (New Species of Syvash Area Flora. J. de l'institut Bot. de l'Acad. des Sci. de la RSS d'Ukraine. Kiev 1939: 246), dessen Kapselzähne die Beschreibung nicht erwähnt, weil die Beschreibung der Kronblätter des *C. syvaschicum* lautet: «petala..calyce tertia parte breviora».

Aus Europa sind bisher von der Sektion *Strephodon* Ser. nur bekannt die einjährigen Arten *C. perfoliatum* Linne (eine ganz kahle Pflanze) and *C. nemorale* M. Bieberstein (Eine Art mit länglich-lanzettlichen bis zu 35 mm langen Stengelblättern und mit bewimperten Kron- und Staubblättern; diese Bewimperung erwähnt *Marschall* v. Bieberstein, Fl. Taurico-Caucasica III, Charkoviae 1819: 317 nicht!).

Aus dem Europa benachbarten West-Asien werden ausser den auch in Europa wachsenden *C. nemorale* M. B. und *C. perfoliatum* L. noch folgende Arten der Sektion *Strephodon* Ser. angegeben: *C. armeniacum* Grenier (mit bewimperten Kron- und Staubblättern), *C. caucasicum* Fischer (Von Williams, Crit. Notes on some species of *Cerastium*, J. of Bot, XXXVII, 1899: 211 wird es zu dem einjährigen *C. nemorale* var. *glabrescens* Ledebour gestellt, von Grenier, Mon. de Cerastio, Vesontione 1841: 13 wird es zu dem mehrjährigen *C. dahuricum* Fischer gezogen. Nach mir vorliegenden Belegen aus dem Herbarium des Botanischen Institutes der Universität in Wien = Möschl Rev. — Nr. 10732 + 10733 ist es eine mehrjährige Art, deren Kron- und Staubblätter bewimpert sind.), *C. chlorifolium* Fischer & Meyer (eine ganz kahle Pflanze), *C. holosteum* Fischer (Nach Schischkin in Komarov, Fl. URSS VI, Mosqua-Leningrad 1936: 431 + 443-444 sind die Kelchblätter nur an ihrem Grunde behaart; Grenier, Mon. de Cerastio, 1841: 13 stellt diese Art zum mehrjährigen *C. dahuricum* Fischer), *C. micro-*

spermum C. A. Meyer (mit bewimperten Kron- und Staubblättern), und *C. Tournefortii* Grenier (eine kahle Art, von der nur ein Fragment bekannt ist; möglicherweise mehrjährig).

Alle diese aus Europa und dem benachbarten West-Asien bekannten einjährigen strephodonten Cerastien können von *C. vourinense* leicht unterschieden werden, wie die Anmerkungen in obiger Aufzählung zeigen.

C. vourinense hat dieselben eiförmigen Endzellen an den Drüsenhaaren wie das einjährige, aber orthodonte *C. bulgaricum* Uechtritz der Balkanhalbinsel. Das äusserste Kelchblatt beider Arten ist ohne Hautspitze und fast ausschliesslich von Drüsenhaaren bis zur Spitze bedeckt. *C. bulgaricum* hat aber eine strahlige Plazenta (Möschl: Die Sippe des *Cerastium ramosissimum* Boiss.; Öst. Bot. Z. XCII, 1943: 163, Fig. 8 = Plazenta, Fig. 13 = Samenwarze, Fig. 17 + 18 = Drüsenzellen), *C. vourinense* dagegen eine stabförmige Plazenta, wie *C. semidecandrum* L. (Möschl: *Cerastium semidecandrum* Linne, sensu latiore. Mem. da Soc. Broteriana V, 1949: 9, Fig. 36). — An *C. vourinense* erinnern niedere Exemplare des mehrjährigen (einjährig nach der Original-Beschreibung von Meyer: Verzeichnis d. Pflanzen, welche ... i. d. J. 1829 u. 1830 untern. Reise im Caucasus u. i. d. Prov. am westl. Ufer des Casp. M. gef. u. einges. worden sind. Kais. Akad. d. Wiss. in St. Petersburg, St. Petersburg 1831: 222; aber mehrjährig nach Ruprecht: Fl. Caucasi I, Mém. de l'Acad. Imp. des Sci. de St.-Pétersbourg, VII. sér., t. XV/2, St.-Pétersbourg 1869: 227 und nach Belegen aus dem Herbarium des Bot. Inst. d. Univ. Wien = Möschl Rev.-Nr. 10737-10740) strephodonten *C. multiflorum* C. A. Meyer aus dem Kaukasus durch die Form und die Behaarung der Stengelblätter. Die Kron- und Staubblätter des *C. multiflorum* sind aber immer gut bewimpert und die Plazenta strahlig. — In seiner Tracht ähnelt *C. vourinense* am meisten dem einjährigen strephodonten *C. armeniacum* Grenier in Kleinasien. *C. armeniacum* hat aber bewimperte Kron- und Staubblätter, eine strahlige Plazenta, eine den Kelch deutlich überragende und leicht gekrümmte Kapsel (oft von fast doppelter Kelchlänge) und stets nur niedere Samenwarzen (bis 0,05 mm hoch).

Das auffälligste Merkmal des *C. vourinense* gegenüber ähnlichen Arten der Sektionen Strephodon und Orthodon sind

die Warzen auf den Rücken der flachen Samen. Der Rücken des Samens ist mit 4 Reihen Warzen besetzt, in deren Mitte der Rücken eine versteckte seichte Längsfurche besitzt. Oft sind einzelne Warzen beiderseits dieser Mittelfurche zylindrisch verlängert (bis zu 0,3 mm hoch), manchmal viele und dann auch mehrere Warzen der äusseren beiden Warzen-Reihen des Samen-Rückens. Samen, deren Rücken reichlich mit solchen Zylinder-Warzen verziert ist, erinnern an Samen der Gattung *Heliosperma*. Diese Zylinder-Warzen sind wie alle niedrigen Warzen des Samens dünnwandig, aber durchscheinender als letztere. In trockenem Zustande sind sie mit Luft erfüllt und dienen offensichtlich als Schwebe-Einrichtung, welche die Verbreitung der Samen durch Verwehen fördert. Eine und dieselbe Kapsel enthält sowohl Samen, deren Rücken nur sehr flach gewölbte Warzen besitzt, als auch Samen, deren Rücken mit einzelnen bis vielen Zylinder-Warzen geschmückt ist.

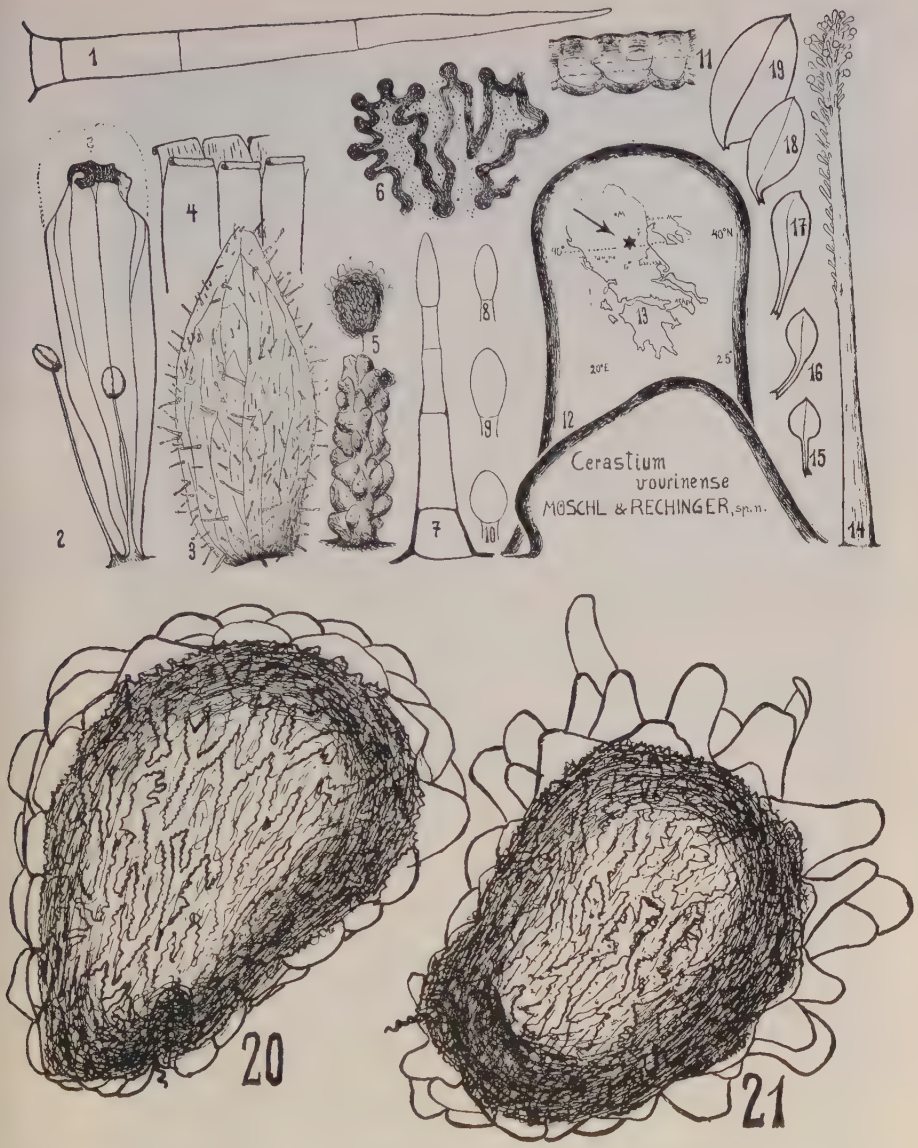


Fig. 1-21 — *C. vourinense* MÖSCHL & RECHINGER

1 = pilus eglandulosus (150 × amplif.); 2 = petalum cum filamentis (10 × amplif.); 3 = sepalum extremum (10 × amplif.); 4 = dentes revoluti capsulae maturae siccaeque (10 × amplif.); 5 = placenta matura cum semine (10 × amplif.); 6 = fines verrucae desuper visae (300 × amplif.); 7 = pilus glandulifer (150 × amplif.); 8-10 = cellulae glandulosae pilorum (150 × amplif.); 11 = paries capsulae maturae sectione transversa sub dentibus facta (300 × amplif.); 12 = verrucae seminis in sectione a latere visae (300 × amplif.); 13 = tabula geographica cum loco classico; 14 = stylus (33 × amplif.); 15-19 = series foliorum a folio infimo (= 15) ad folium summum (= 19; folia omnia in magnitudine vera et sine pilis delineata); 20-21 = semina (70 × amplif.).

Fig. 22 = *Cerastium vourinense* Möschl & Rechinger, typus (Möschl nr. rev. 10329).

NEW AND LITTLE KNOWN SPECIES FROM THE FLORA ZAMBESIACA AREA

X

OXALIDACEAE

by

A. W. EXELL

Oxalis semiloba Sond., in Harv. & Sond., Fl. Cap. **1**: 350 (1860).

Subsp. **uhehensis** (Engl.) Exell, stat. nov.

Oxalis uhehensis Engl., Bot. Jahrb. **28**: 412 (1900); Pflanzenw. Afr. **3**, 1: 716, fig. 330 (1915). — Knuth in Engl., Pflanzenr. IV, 130: 309, fig. 20 (1930). Type: Tanganyika, Uhehe Plateau, *Goetze* 499 (B†; BM).

Oxalis morrumbalaensis De Wild., Pl. Nov. Hort. Then.: t. 36 (1905). Type: Mozambique, Zambézia, Morrumbala, *Luja* 368 (BR).

Oxalis angustiloba R. E. Fr., Schwed. Rhod.-Kongo-Exped. **1**: 107 (1914).— Knuth in Engl., Pflanzenr. IV, 130: 310 (1930). — Wilczek, Fl. Cong. Belg. et Ruanda-Urundi **7**: 10 (1958). Type: near Abercorn, Msisi, *Fries* 1389 (UPS).

NORTHERN RHODESIA. **Northern Prov.**: Katonina Hills, fl. & fr. 27.XII.1907, *Kassner* 2163 (BM; K); Shiwa Ngandu, fl. 7.I.1937, *Ricardo* 148 (BM). **Western Prov.**: c. 1.6 km E of Mwinilunga, fl. 27.XI.1937, *Milne-Redhead* 3419 (BM; K). **Eastern Prov.**: Chadiza, 850 m, fl. 28.XI.1958, *Robson* 766 (BM; K; LISC; SRGH).

NYASALAND. **Central Prov.**: Dedza Distr., Dzenza Forest Reserve, 1220 m, fl. & fr. 21.III.1955, *Exell, Mendonça & Wild* 1100 (BM; LISC; SRGH); Kasungu Distr., Chipala Hill, Chipama,

1050 m, fl. & fr. 16.I.1959, *Robson* 1218 (BM; K; LISC; SRGH). **Southern Prov.:** Shire Highlands, fl. 1887, *Last* s. n. (K).

MOZAMBIQUE. **Niassa Prov.:** 16 km N of Mandimba, fl. 24.XI.1941, *Hornby* 3477 (K; PRE); Serra de Ribáuè, fl. & fr. 1.I.1937, *Torre* 1096 (COI). **Zambézia Prov.:** Morrumbala, 915 m, fl. 30.XII.1858, *Kirk* s. n. (K); Namagoa, Mocuba, 60-120 m, fl. & fr. V.1943, *Faulkner* 158 (K; PRE).

This subspecies is apparently very distinct from subsp. *semiloba* and there seems at first sight to be no reason for not maintaining them as distinct species. Salter [in Journ. S. Afr. Bot. Suppl. Vol. **1**: 87 (1944)] had already noticed a transition between them saying (with reference to *O. semiloba* and its allies) «it is possible that the species *O. angustiloba* R. E. Fries from Rhodesia and *O. uhehensis* from Tropical Africa, both with very deeply lobed leaflets, merge into this group». *Kassner* 2163 (BM) shows the transition from a very narrowly lobed leaflet to a form almost indistinguishable from subsp. *semiloba*, while *Torre* 4892 (LISC), from the Zambézia Province of Mozambique, completes the cline with specimens one of which is practically indistinguishable from the broadest from of *Kassner* 2163, while others range to typical subsp. *semiloba*. The great majority of the specimens fall very clearly into one or other of the two subspecies but, as is nearly always the case in this part of the world, a few specimens are intermediate and cannot be satisfactorily classified.

Oxalis chapmanae Exell, sp. nov.

Herba acaulis vel fere acaulis perennis bulbosa, ad 25 cm alta. *Bulba* ovoidea acuta, usque c. 2 × 1.5 cm. *Folia* basalia rosulata petiolata, petiolo 4-16 cm longo sparse pubescenti vel fere glabro, trifoliolata, foliolis sessilibus angustissime ellipticis vel linearibus, 40-80 × 1-10 mm, fere glabris, apice callosis, subtus faveolatis, costa media subtus applanata. *Flores* purpurei vel purpureo-rosei pedicellati, pedicellis 8-20 mm longis sparse pubescentibus vel fere glabris, in pseudo-umbellas 4-7-floras dispositi; pedunculus 7-24 cm longus, pubescens vel fere glaber. *Sepala* elliptica, 5-6 × 1.5-3 mm, pubescentia vel fere glabra,

apice callosa. *Petala* ad 15 mm longa, glabra. *Stamina* 5 longiora 5 mm longa, 5 breviora 1.5 mm longa, filamentis puberulis. Styli 4.5 mm longi, pubescentes. *Ovarium* ellipsoideum, 2 × 1.5 mm, stylis 4.5 mm longis, pubescentibus. *Stamina* applanato-ellipsoidea, 1 × 0.6 mm, brunnea.

NORTHERN RHODESIA. **Eastern. Prov.:** Nyika Plateau, 2130 m, fl. 2.I.1959, *Robinson* 2989 (K; SRGH).

NYASALAND. **Northern Prov.:** Nyika grassland, 2130-2440 m, fl. & fr. I.1953, *E. G. Chapman* 73 (BM, holotype); Nyika Plateau, above Nchena-chena, fl. & fr. 4.V.1952, *White* 2589 (K); Nyika Plateau, 2200 m, fl. 3.V.1960, *J. M. Wright* 256 (BM; K).

« Weakly erect perennial. Flowers bright magenta-pink » (Robinson). « Small delicate bulbous plant; trifoliolate leaves; leaflets ensiform; light purple flowers. Scattered over grassland » (E. G. Chapman). « Plant 6 inches high, leaves and flowers arising from the ground; leaves trifid. Flowers 3-4 to an inflorescence, white at base, bright carmine distally » (J. M. Wright).

Apparently confined to the Nyika Plateau.

Probably nearest to *O. oligotricha* Bak. but with much narrower leaflets and occurring at higher altitudes.

Biophytum nyikense Exell, sp. nov.

Herba perennis ad 10 cm alta, caule subteranneo simplice lignoso ± incrassato. *Folia* 2-8 cm longa, paripinnata, semper basalia ad apicem caulis subterranei conferta; foliolis 4-10-jugatis, 2-8 × 2-7.5 mm, obliquis subcircularibus, margine ciliatis ceteroque glabris, apice rotundatis, basi truncatis; rhachide pubescenti et piloso. *Flores* flavidi pedicellati, pedicellis ad 5 mm longis glanduloso-pubescentibus, in pseudo-umbellas 3-8-floras dispositi; pedunculus 1-3.5 cm longus, glanduloso-pubescens. *Sepala* 6-7 × 1-1.5 mm, anguste lanceolata 4-6-nervia acuta glanduloso-pubescentia. *Petala* 7-8 × 4-4.5 mm, spathulata, primo libera demum ± coherentia glabra. *Stamina* 5 longiora 2.5 mm longa, 5 breviora 1 mm longa. *Ovarium* 5-lobatum, stylis 5 mm longis pilosis. *Semina* applanato-ellipsoidea castanea, 1.3 × 0.7 mm.

NORTHERN RHODESIA. **Eastern Prov.:** Nyika Plateau, Rest House, 2130 m, fl. 24.IX.1956, *Mrs. F. M. Benson* NR. 145 (BM, holotype); Nyika Plateau, 3.2 km SW of Rest House, 2150 m, fl. & fr. 21.X.1958, *Robson* 207 (BM; K; LISC; SRGH).

NYASALAND. **Northern Prov.:** Nyika Plateau, 2130-2440 m, fl. XI.1932, *Sanderson* 70 (BM).

TANGANYIKA. **Iringa Prov.:** Mbosi, 1580-1620 m, fl. 1935, *Mrs. H. Horsbrugh-Porter* s. n. (BM).

« Burnt grassy hill-slope. Yellow flowers. Small plants in clumps, with sensitive leaves which fold up when touched » (Mrs. F. M. Benson). « Burned grassland. Dwarf herb with woody rootstock. Petals yellow » (Robson).

The petals eventually cohere and the corolla comes off in one mass as though it were gamopetalous.

Distinguished from *B. crassipes* Engl. by the shorter inflorescences, glandular-pubescent sepals, pedicels and peduncle and by the fact that the leaflets have rather closer and more numerous veins. *B. macrorrhizum* R. E. Fr. has almost sessile pseudumbels hidden in the cluster of leaves so that the flowers appear to be solitary; they also have longer pedicels.

Biophytum richardsae, sp. nov.

Herba perennis usque 20 cm alta, caule subterraneo simplice lignoso incrassato apice tomentoso. *Folia* paripinnata, ad 16 cm longa; foliolis 8-10-jugatis fere sessilibus, 5-11 × 2.5-7 mm, oblongis vel late oblongis vel nonnunquam ovato-oblongis vel obovato-oblongis, apice rotundatis margine ciliatis, basi truncatis, margine excepta glabris, costis lateralibus utrinsecus 5-7, rhachide pubescenti vel piloso. *Flores* pallide rubri pedicellati, pedicellis ad 8 mm longis gracilibus pilosis, in pseudo-umbellas 6-8-floras dispositi; pedunculus ad 18 cm longus pilosus. *Sepala* anguste elliptica vel lanceolata, 6-6.5 × 1.5-1.8 mm, 5-7-nervia, pubescentia, rubiginosa. *Petala* c. 8 mm longa, glabra. Stamina 5 longiora 4.5 mm longa, 5 breviora 2.5 mm longa. *Ovarium* 5-lobatum; stylis 1.9 mm longis fere glabris. *Capsula* late ellipsoidea, 3 × 2.5 mm. *Semina* subglobosa vel ellipsoidea, 0.8 × 0.6-0.7 mm, tuberculata, castanea.

NORTHERN RHODESIA. **Eastern Prov.**: Abercorn Distr., Chisau River Gorge, Saisi Valley, alt. 1500 m, fl. & fr. 18.XI. 1959, *Mrs. H. M. Richards* 11795 (BM; K, holotype).

« On ledges of dry cliff. Flowers dull pink; stem and roots woody ».

Very near to *B. kassneri* Knuth from the Congo [Mt. Senga, *Kassner* 2983a (BM)] and Tanganyika [Ufipa Distr., Sumbawanga, *Mrs. H. M. Richards* 8626 (K)] but differing in having longer sepals (6-6.5 mm compared with 4-4.5 mm) and leaflets which are glabrous except for the sparsely ciliate margins (usually pubescent in *B. kassneri*, rarely glabrescent).

SOBRE A IDENTIFICAÇÃO DE *CHANTRANSIA VIOLACEA* KÜTZ.

por

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ENCONTRÁMOS em Portugal, nos rios Coval e Coja, subafluentes do Dão, espécimes sexuados de uma Rodofícea de água doce, que foi identificada como *Chantransia violacea* Kütz. O seu estudo pormenorizado revelou que os exemplares correspondiam às plantas da Alemanha descritas por KÜTZING, devendo, portanto, incluir-se no tipo da espécie.

ISRAELSON (in Symb. Bot. Upsal. VI: 14, 1942), tendo herborizado e estudado na Suécia formas sexuadas do mesmo género, incluiu *Ch. violacea* Kütz. e *Ch. Hermannii* (Roth) Desv. numa só espécie, sob o nome de *Ch. Hermannii* (Roth) Desv.

HAMEL (1925) demonstrou que o nome genérico *Chantransia* não é válido, motivo por que transferiu a espécie para *Audouinella* Bory com a designação de *A. violacea* (Kütz.) Hamel.

Na opinião de KATHLEEN M. DREW (in Ann. Bot. XLIX: 439, 1935; *loc. cit.* L: 419, 1936), *Ch. violacea* Kütz. e *Ch. Boweri* Murray et Barton apresentam grandes semelhanças, devendo reunir-se numa ós espécie, que foi incluída pela autora no género *Rhodochorton* Näg., sob o nome de *Rhodochorton violaceum* (Kütz.) Drew.

Verifica-se, porém, que, pelo menos em parte, o nome genérico *Rhodochorton* Näg. é sinónimo de *Audouinella* Bory e mais recente (1861) do que este (1823). Sendo assim, o nome válido é *Audouinella violacea* (Kütz.) Hamel.

Segundo ISRAELSON *(loc. cit.)*, SKUJA admite que as formas sexuadas das Ilhas Britânicas pertencem indubitàvelmente a uma

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só espécie, mas não está convencido da identidade delas com *Ch. violacea*, que tem sido encontrada só com monosporângios no Continente europeu e nas outras partes do mundo. As plantas colhidas em Portugal, que incluem as formas sexuada e assexuada, apresentam caracteres que não se harmonizam inteiramente com as descrições de Drew e de Israelson, o que motivou o presente trabalho.

Descrição da planta

Talo de 1-3 mm, violáceo, em tufos (Est. I, fig. *a*) fixados sobre várias espécies de *Lemanea* mediante um sistema de filamentos reptantes, irregularmente ramificados (Est. I, fig. *b*). Ramificação abundante (Est. I, fig. *a*), geralmente irregular, excepcionalmente alterna ou oposta, por vezes unilateral em extensões mais ou menos consideráveis. Células cilíndricas de 5-10 μ de diâmetro e 15-52 μ de comprimento, com núcleo central e plastídios parietais. Paredes das células de 1,5-3,33 μ de espessura. Pêlos terminais cónicos, curtos e raros. Polióica; plantas assexuadas muito mais frequentes que as sexuadas e as monóicas muito mais raras que as dióicas.

Planta assexuada. Monosporângios muito numerosos (Est. I, fig. *c*), terminando ramúsculos de primeira e de segunda ordem ou ainda sésseis ao longo daqueles, elipsóides, de 7,5-9 $\times$ 9-12 μ, encontrando-se não só nos exemplares assexuados, mas também nos exemplares femininos, masculinos (Est. I, fig. *d*) e monóicos. Tetrasporângios ocasionais, na extremidade dos ramúsculos (Est. I, fig. *e*).

Planta masculina (Est. I, fig. *f*). Fácil de reconhecer à lupa, em certos casos, devido à densa ramificação e aos espermatângios agrupados em glomérulos aparentes, disseminados nos tufos. Células dos filamentos diminuindo progressivamente de comprimento para as extremidades, quando os ramúsculos espermatangíferos atingem o ápice. Espermatângios esferóides, elipsóides ou quase cilíndricos, de 3-3,5 $\times$ 3-4,5 μ, terminando pedicelos verticilados ou penatiformes, com eixo central de 2-5 células cilindróides.

Planta feminina. Muito mais rara do que a masculina, em

tufos pouco ou muito densos; ramificação irregular, divaricada na base dos gonimoblastos (1-5 ramos) (Est. II, fig. *a*, *b*), o que os torna fáceis de reconhecer à lupa. Carpogónios terminando ramúsculos ou ramos (Est. II, fig. *c*), raramente sésseis (neste caso opondo-se ou não a um ramo), cilíndricos, não se distinguindo das células vegetativas senão pela existência do tricogínio e da cor esverdeada, de 3,33-5 × 8-16 μ (muito raramente 20 μ). Tricogínio cilíndrico (Est. II, fig. *d*) ou subtroncónico com uma constrição na base. Gonimoblastos na metade superior dos filamentos (monosporângios na inferior) ou na parte média (monosporângios na inferior e na superior), morulóides (Est. II, fig. *e*), 13-40 × 13-46 μ, ou racimiformes, 33-46 × 43-52 μ, com o eixo central de 1-5 células cilindróides (Est. II, fig. *a*, *b*); pedicelos gonimoblásticos de primeira ordem verticilados e os de segunda dispostos irregularmente. Carposporângios elipsóides ou esferóides, de 9-10,5 × 10,5-12 μ.

Variabilidade de alguns caracteres em *A. violacea* (Kütz.) Hamel

a) Ramificação irregular. Nas plantas colhidas em Portugal, encontram-se filamentos fasciculados desde a base com grandes intervalos entre os fascículos; filamentos com ramificação quase unilateral; outros em que os ramos primários são alternos e os secundários não têm disposição definida; e ainda outros, muito mais frequentes, providos de uma mistura de ramos unilaterais, a pequenos espaços, com alternos ou opostos. Nos filamentos masculinos, quando a frutificação é abundante, dá-se uma transformação das células apicais em ramúsculos espermatangíferos, mediante a redução, progressivamente ascendente, do comprimento das últimas células (Est. II, fig. *f*).

b) Comprimento celular (ver Quadro I). As células das plantas assexuadas diminuem de comprimento de Dezembro para Abril, na média de 6 μ, igualando assim as das plantas sexuadas. Pelo contrário, o diâmetro de 5-10 μ, encontrado por Hamel (in Rev. Algol. II: 46, 1925), mantem-se constante nas plantas assexuadas do Inverno e da Primavera, sendo sensivelmente o mesmo das plantas sexuadas.

QUADRO I

Dimensões das células dos filamentos e das frutificações das plantas portuguesas de *Audouinella violacea* (Kütz.) Hamel

a) Plantas assexuadas	Diâmetro	Comprimento	Monosporângios
Colheita de 31-XII-1959	(4,5) 5-10 (12) μ	(16) 20-52 (60) μ	7,5-9 × 9-12 μ
Colheita de 26-IV-1960	(4,5) 5-10 (12) μ	(12) 15-45 (52) μ	7,5 × 10,5-12 μ
b) Plantas masculinas			Espermatângios
Colheita de 26-IV-1960	(4,5) 5-10 (?) μ	(12) 15-45 (50) μ	3-3,5 × 3-4,5 μ
c) Plantas femininas			Carpogónios
Colheita de 26-IV-1960	(4,5) 5 10 (?) μ	(12) 15-45 (52) μ	3,33-5 × 8-20 μ
			Carposporângios
			9-10,5 × 10,5-12 μ

Confronto de *A. violacea* (Kütz.) Hamel com *Rh. violaceum* (Kütz.) Drew e *Ch. Boweri* Murray et Barton

Como foi dito, Kathleen M. Drew é de opinião que *Rh. violaceum* e *Ch. Boweri* devem reunir-se numa só espécie.

A variabilidade da ramificação é comum aos três taxa, notando-se, no entanto, que a capacidade frutífera é diferente. Assim, os ramúsculos, os ramos e até os filamentos de *A. violacea* podem produzir carpogónios terminais, enquanto estes nunca foram encontrados nos ramúsculos com mais de 2 células em *Rh. violaceum*. A variação de comprimento das células na transição do Inverno para a Primavera é também comum aos três taxa, mas não no mesmo grau. As diferenças entre o

comprimento médio das células dos filamentos femininos e o das plantas assexuadas, na pior das condições, isto é, com medições de material assexuado do Inverno, não ultrapassa 7 μ em *A. violacea* e atinge 16,5 μ em *Rh. violaceum* (Confr. Quadro I e Drew, *loc. cit.*).

Por outro lado, há caracteres estáveis em *A. violacea* com os quais não se harmonizam os correspondentes de *Rh. violaceum*, como se pode ver no Quadro II e Est. III. Com efeito:

a) Os carpogónios (Est. III, fig. *a*, 1, 2) e os respectivos tricogínios de *A. violacea* (Kütz.) Hamel, nas primeiras fases de desenvolvimento, são cilíndricos. Os carpogónios (Est. III, fig. *a*, 3, 4) de *Rh. violaceum* (Kütz.) Drew, nas primeiras fases de desenvolvimento, são barriliformes. Os respectivos tricogínios são obovóides.

b) O tricogínio e o carpogónio (Est. III, fig. *b*, 4) de *A. violacea* (Kütz.) Hamel, na fase da fecundação, mantêm-se cilíndricos e nota-se perfeitamente uma constrição na base do tricogínio. Este, após a fecundação, torna-se flácido e desaparece (Est. II, fig. *c*). Em *Rh. violaceum* (Kütz.) Drew (Est. III, fig. *b*, 2, 3) acentua-se a forma barriliforme do carpogónio, na fase de fecundação, e o tricogínio, passando pela forma obovóide alongada, tende para obcónico, sem vestígio de constrição na base. A forma do carpogónio de *Chantransia Boweri* Murray et Barton não parece suficientemente definida para poder caracterizar-se (Est. III, fig. *b*, 1). O tricogínio parece subulado.

c) O gonimoblasto de *Audouinella violacea* (Kütz.) Hamel (Est. III, fig. *c*, 1), em formação, é constituído por um eixo central cercado de verticilos gonimoblásticos. Em *Rh. violaceum* (Kütz.) Drew, o gonimoblasto (Est. III, fig. *c*, 2) não apresenta eixo central. Os filamentos gonimoblásticos partem directamente da célula carpogonial única. E o tricogínio (Est. III, fig. *c*, 2, t) conserva-se até à formação dos carposporângios, o que é natural, graças ao facto de o carpogónio não produzir eixo central dos filamentos gonimoblásticos.

Convém notar também que os diâmetros médios das células dos filamentos e os dos carpogónios (na base) são maiores em *Rh. violaceum* do que em *A. violacea*.

QUADRO II

Confronto entre os caracteres considerados estáveis de *A. violacea* (Kütz.) Hamel, *Rh. violaceum* (Kütz.) Drew. e *Ch. Boweri* Murray et Barton

Carácter	*A. violacea*	*Rh. violaceum*	*Ch. Boweri*
Disco sólido na base	Ausente	Presente	?
Diâmetro médio dos filamentos	7,5 μ	9 μ	8,5 μ
Presença ou ausência de ramo oposto ao carpogónio, quando este é séssil	Presente ou ausente	Ausente	Presente
Forma do carpogónio	Cilíndrica 3,33-5 × 8-20 μ Est. III, fig. *a*, 1 e 2 (setas)	Barriliforme 4-6 × 9-13 μ Est. III, fig. *a*, 3 e 4 (setas)	?
Forma do tricogínio	Cilíndrica Est. III, fig. *b*, 4 (seta)	Oboval ou obcónica Est. III, fig. *b*, 2, 3	Subulada
Eixo carpogonial com filamentos gonimoblásticos verticilados	Presente Est. III, fig. *c*, 1	Ausente Est. III, fig. *c*, 2	Ausente
Dimensões dos carposporângios	9-10,5 × 10,5-12 μ	6-7,5 × 7,5-10 μ	?
Saliências ponteagudas na parte superior das células	Ausentes	Presentes	?

Pelo contrário, nos carposporângios são os diâmetros de *A. violacea* maiores.

Pelos carpogónios terminando ramúsculos com mais de 3 células e pelos ramos opostos a gonimoblastos sésseis, *Ch. Boweri* aproxima-se de *A. violacea*. No entanto, se em tudo o mais é equivalente a *Rh. violaceum*, como afirma Drew, então não pode identificar-se perfeitamente com *A. violacea*.

Confronto de *A. violacea* (Kütz.) Hamel com *Ch. Hermannii* (Roth) Desv. emend. Israels.

Como dissemos, Israelson *(loc. cit.)*, na Suécia, estudou exemplares sexuados do mesmo género e chegou à conclusão de que *Ch. violacea* Kütz. e *Ch. Hermannii* (Roth) Desv. deviam considerar-se uma só espécie.

Além disso, embora preferisse o nome de *Ch. Hermannii* (Roth) Desv. para aquela espécie, entendia que, «no essencial, a sua conformidade com as formas britânicas parecia ser completa». Por consequência, os espécimes herborizados por este autor não correspondem ao tipo da espécie *A. violacea*.

De tudo o que foi exposto, resulta que a comparação entre as nossas plantas e as mencionadas por Drew e por Israelson, respectivamente sob *Rhodochorton violaceum* (Kütz.) Drew e *Chantransia Boweri* Murray et Barton, *Chantransia violacea* sensu Drew e *Chantransia Hermannii* (Roth) Desv. emend. Israel. mostra a existência de certas diferenças que nos levam a admitir que estas devem provàvelmente ser distinguidas ou como variedades dentro de *Audouinella violacea* (Kütz.) Hamel, ou mais provàvelmente como uma espécie diferente.

ESTAMPAS

Estampa I

Audouinella violacea (Kütz.) Hamel

a) Pequena porção de um tufo jovem da forma assexuada. × 125.
b) Filamento reptante com jovens ramos ascendentes. × 280.
c) Monosporângios elipsóides terminando ramúsculos de primeira e de segunda ordem ou ainda sésseis ao longo daqueles. × 385.
d) Porção de filamento frutífero com espermatângios e monosporângios, estes muito maiores. × 640.
e) Tetrasporângio na extremidade de um ramúsculo (seta), vendo-se perfeitamente a divisão transversal. × 560.
f) Planta masculina muito ramificada irregularmente desde a base. Por vezes ramificação unilateral em extensões mais ou menos consideráveis. × 60.

Audouinella violacea (Kütz.) Hamel

Estampa II

Audouinella violacea (Kütz.) Hamel

a) Porção do talo da planta feminina com ramificação divaricada na base do gonimoblasto em formação (seta). × 430.

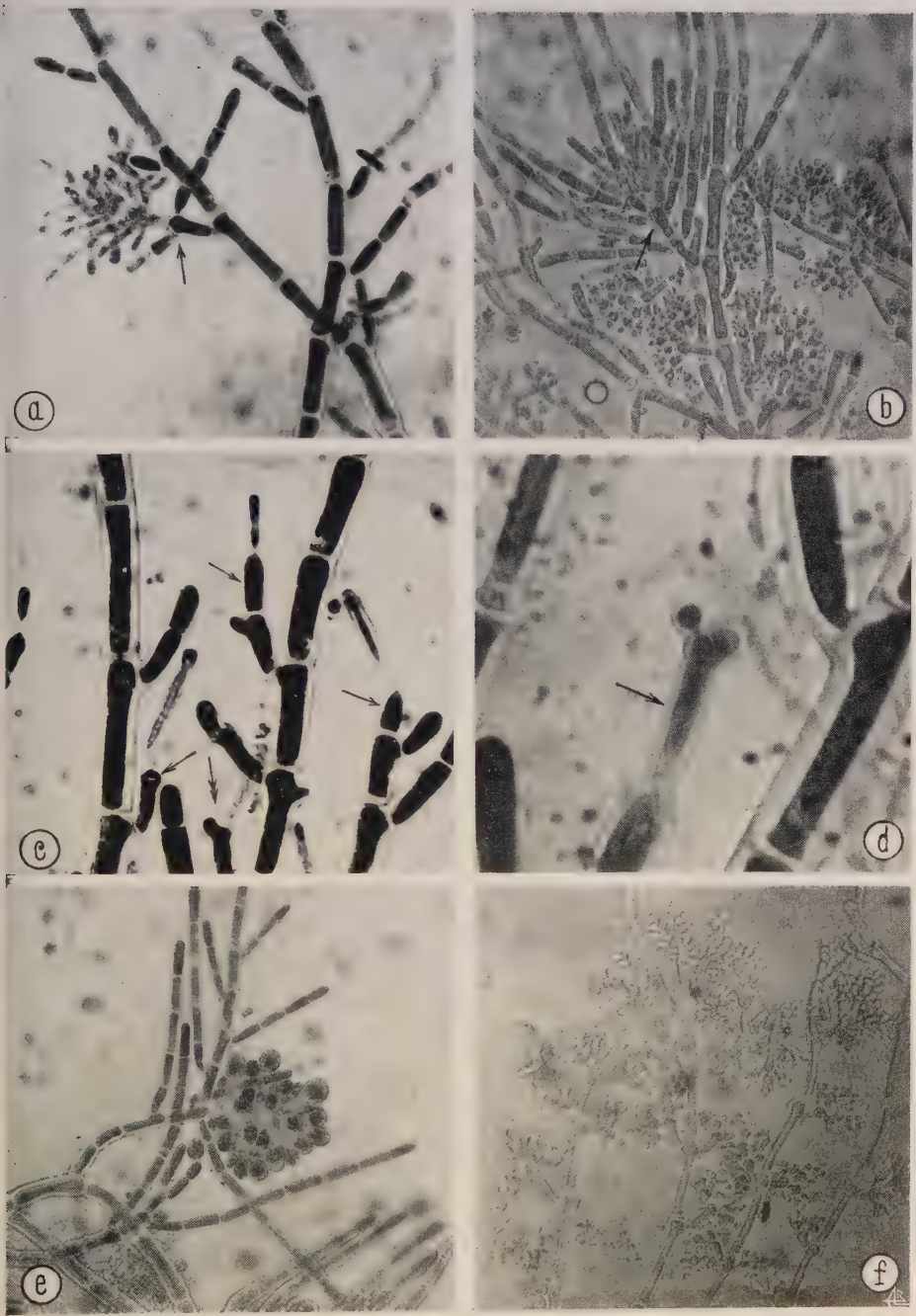
b) Filamento com ramúsculos masculinos (espermatângios muito pequenos) e um eixo carpogonial (seta) com ramificação divaricada. × 340.

c) Carpogónios terminando ramos e ramúsculos ou sésseis (setas). Notar o tricogínio flácido, tendendo a desaparecer (seta dupla). × 860.

d) Tricogínio cilíndrico (em fecundação) com uma constrição na base (seta). × 1280.

e) Gonimoblasto morulóide na extremidade de um ramúsculo. × 340.

f) Extremidades da planta masculina com as células apicais mais curtas e transformadas em ramúsculos espermatangíferos. × 340.



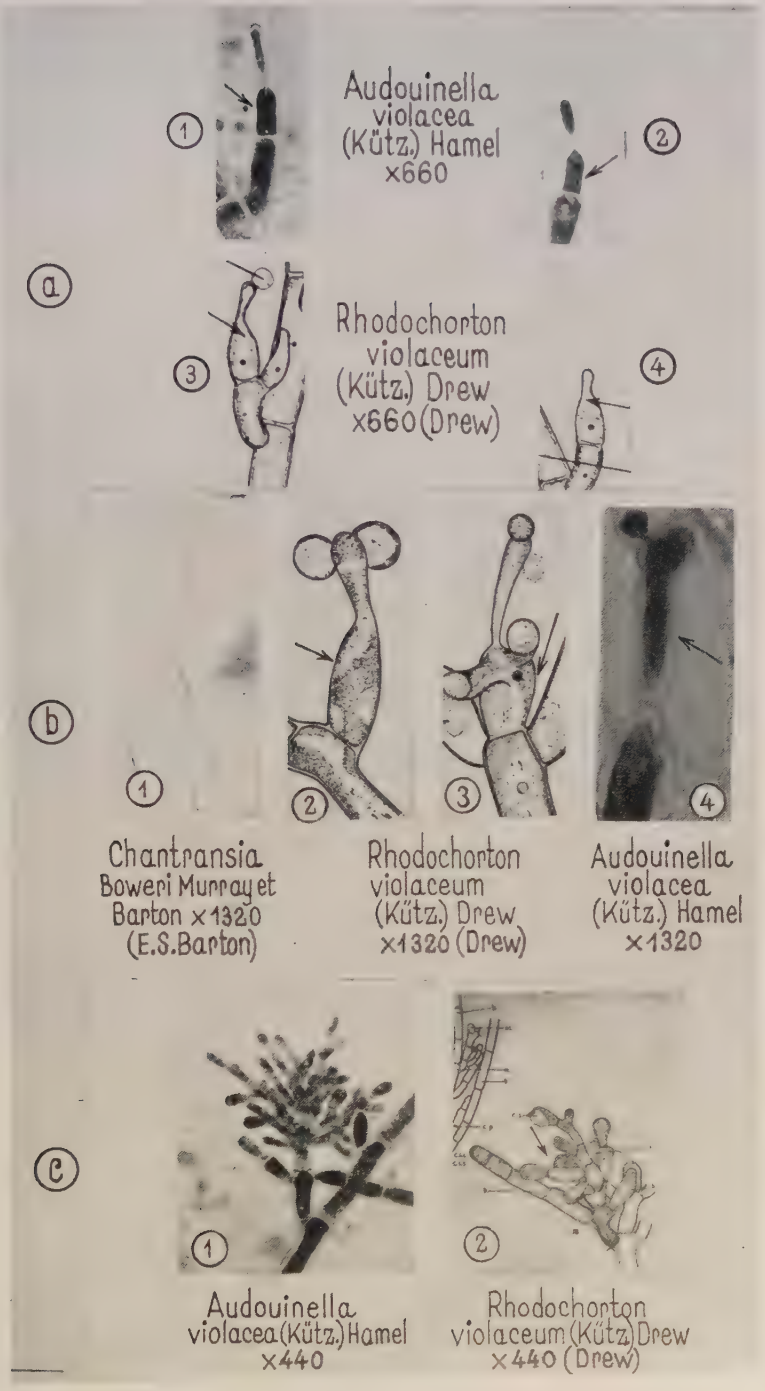
Audouinella violacea (Kütz.) Hamel

Estampa III

a) Carpogónios (1, 2-setas) e respectivos tricogínios de *A. violacea* (Kütz.) Hamel. Carpogónios (3, 4-setas) com tricogínios de *Rh. violaceum* (Kütz.) Drew. Órgãos no início do desenvolvimento. (Original de Drew, *loc. cit.*).

b) Tricogínio e carpogónio (1) de *Ch. Boweri* Murray et Barton. Idem de *Rh. violaceum* (Kütz.) Drew. (Original de Drew, *loc. cit.*). Idem (4-seta) de *A. violacea* (Kütz.) Hamel. Órgãos perfeitamente desenvolvidos.

c) Gonimoblasto (1) de *A. violacea* (Kütz.) Hamel, em desenvolvimento. Idem (2) de *Rh. violaceum* (Kütz.) Drew, vendo-se carposporângios (c. s. e seta). (Original de Drew, *loc. cit.*).


a
1
Audouinella violacea (Kütz.) Hamel ×660
2
3
Rhodochorton violaceum (Kütz.) Drew ×660 (Drew)
4
b
1
2
3
4
Chantransia Boweri Murray et Barton ×1320 (E.S.Barton)
Rhodochorton violaceum (Kütz.) Drew ×1320 (Drew)
Audouinella violacea (Kütz.) Hamel ×1320
c
1
2
Audouinella violacea (Kütz.) Hamel ×440
Rhodochorton violaceum (Kütz.) Drew ×440 (Drew)

TURNERACEAE AFRICANAE NOVAE VEL MINUS COGNITAE—I

AUCTORIBUS

A. FERNANDES et ROSETTE FERNANDES

Wormskioldia elata, sp. nov.

Herba annua, erecta. *Caulis* simplex usque ad 1 m altus, teres, striatus, pilis patentibus cum setis raris, difficile conspicuis, brevissimis, aureis vel brunnescentibus ad basim paulatim incrassatis, intermixtis, vestitus. *Folia* aequalia, sessilia, inferiora 9 × 2 cm, superiora paulatim minora usque ad 2,5 × 0,5 cm, ambitu lanceolata, ad basim et paullo infra medium lobulis 2 parvis suboppositis saepe crenatis et glanduligeris, glandulis conspicuis, instructa, apice etiam interdum glandula munita, penninervia, discoloria, utrinque densiuscule pilosa. *Inflorescentiae* foliis multo longiores, 6-8-florae, floribus dimorphis. *Pedunculi* 25-30 cm longi, pilosi; prophylla minuta, 1,5-2 mm longa, margine ciliolata; pedicelli circ. 3 mm longi, pilosi. *Calyx* extus pilosus, 13 mm longus, tubo circ. 9,5 mm longo et lobis circ. 3,5 mm longis, intus ad basim villosus. *Petala* intense coccinea, glabra, circ. 20 mm longa. *Flos longistylus:* filamenta staminum majorum 7 mm longa, antherae 2,5 mm; filamenta staminum minorum 5,6 mm longa; styli circ. 8 mm longi; ovarium 3,5 mm longum, glabrum. *Flos brevistylus* observatus sed non mensuratus. *Pedicelli fructiferi* primo erecti, deinde arcuato-deflexi. *Capsula* usque 5 cm × 1,25 mm, rostro circ. 6 mm, (8) 18-27-sperma, glabra. *Semina* 2 mm longa, arillo rectangulari ultra medium seminis attingente.

Fl. et fr.: April.

Tab. I et II.

Habitat in *Moçambique* inter *Nampula* et *Corrane* et inter *Corrane* et *Nametil*, 11-IV-1937, *Torre* 1273 (COI, holotypus; LISC).

« Erva anual, erecta, com flores escarlates. No mato xerófilo. Muito dispersa » (A. R. da Torre).

Affinis W. lobatae Urb. a qua caule simplici usque ad 1 m alto, pilis patentibus dense vestito neque ramoso vix usque ad 0,30 cm alto, pilis crispis minutis instructo; foliis minoribus (2,5-9 × 0,5-2 cm neque 6-12,5 × 1-3,5 cm), glandulis lobulorum conspicuioribus; inflorescentiis longioribus 6-8-floris neque 2-4-floris; floribus heterostylis neque homostylis; petalis cinnabarinis neque luteis praecipue differt.

Wormskioldia lanceolata, sp. nov.

Herba annua, erecta. *Caulis* simplex vel a basi paullo ramosus, usque ad 60 cm altus (vel ultra?), teres, pilis brevibus, tenuibus, incurvis ± dense vestitus cum setis sparsis circ. 0,5 mm longis, apice flavidis et secernentibus, basi brunnescentibus et paulatim incrassatis intermixtis. *Folia* sessilia vel breviter petiolata, petiolo 1-2 mm longo, lanceolata, usque ad 15 × × 1,5 cm, membranacea, discoloria, conspicue penninervia, inferne angustata, saepe glandulis 2 oppositis, anguste oblongis et sessilibus, juxta basim instructa, apicem versus sensim attenuata, acuta, margine leviter ondulata et remote denticulata, dentibus minutissimis, utrinque ± sparse pilosa vel glabra. *Inflorescentiae* folia 2-plo superantes, (4) 5-7 (9)-florae, floribus dimorphis; pedunculi usque 25 cm longi, inferne pilis brevibus patentibusque sparse vestiti, superne glabri; prophylla bina, opposita vel subopposita, interdum trina, lanceolata, circ. 2 mm longa, scariosa, apice breviter setosa; pedicelli floriferi circ. 2,5 mm longi, fructiferi circ. 4 mm, primo ascendentes deinde arcuato-deflexi. *Calyx* extus fere glaber, breviter sparseque setulosus, tubo 10 mm longo intus inferneque villoso, lobis oblongo-linearibus 5 mm longis, juxta infra apicem seta brunnea instructis. *Petala* aurantiaca, glabra, circ. 22 mm longa, tubo calycis 3,5 mm longe adnata, inferne longissime (10 mm) cuneato-angustata, superne rhomboideo-obovata (± 9 × 5 mm). *Flos brevistylus* filamentis staminum longiorum 12 mm longis, breviorum 9 mm longis, antheris omnium circ. 3 mm, stylis 3 mm longis, apice stigmatifero laceratis; ovarium 3 mm lon-

gum. *Flos longistylus* non vidimus. *Fructus* primo erectus deinde curvato-deflexus, 3-20-spermus, usque 5,5 cm longus et 1,5 mm crassus, apice usque 6 mm longe rostratus. *Semina* oblonga, 2,5 × 1,25 mm, maturitate nigra, arillo stramineo et angusto (0,75 mm), medium seminis paullo superante.

Fl. et fr.: Februarius-April.

Icon. nostr. Tab. III.

Habitat in *Moçambique*, regione *Mutuáli* ad margines viae dictae *Malema*, 25-II-1954, *Gomes e Sousa* 4222 (COI, holotypus; LMJ).

« Mutuáli, estrada de Malema, a 5 km da Estação Algodoeira. Planta herbácea. Flores alaranjadas. Na floresta aberta. Solo castanho, argilo-arenoso. Frequente. Fl. Fev., Março » (A. Gomes e Sousa).

Habitat etiam in *Moçambique*, regione *Manica e Sofala*, in loco dicto *Corrane* prope *Inhaminga*, alt. 50 m, 20-IV-1956, *Gomes e Sousa* 4310 (COI).

« Subarbusto ou planta herbácea. Flores vermelhas. Na floresta aberta de *Brachystegia*. Solo arenoso. Frequente em vários lugares» (A. Gomes e Sousa).

Affinis W. lobatae Urb. a qua caule simplice vel paullo ramoso usque ad 60 cm alto neque caule a basi satis ramoso 30 cm alto; setis conspicuioribus; foliis lanceolatis proportionaliter longioribus et angustioribus (usque 15 × 1,5 cm neque 6-12,5 × 1-3,5 cm); glandulis basis foliorum anguste oblongis sessilibus in lobulis rotundatis non colocatis; inflorescentia longiore, (4) 5-7 (9)-flora neque 2-4-flora praecipue differt.

Affinis etiam W. elatae A. et R. Fernandes a qua pilis caulis crispis neque patentibus; foliis lanceolatis longioribus et angustioribus (11 × 1,5 cm neque 9 × 2 cm); glandulis basis foliorum anguste oblongis, sessilibus in lobulis rotundatis non dispositis praecipue differt.

Wormskioldia auriculata, sp. nov.

Herba annua, erecta. *Caulis* simplex usque ad 90 cm altus, circ. 3 mm crassus, teres, leviter striatus, laxe foliatus, pilis

tenuibus et crispis ± dense vestitus, cum setis debilibus basi non bulbosis usque ad 1,5 mm longis apice non secernentibus intermixtis. *Folia* breviter petiolata, petiolo vix 1 mm longo, anguste lanceolata, circ. 5,5 × 0,4 cm, basi contracta et biauriculata, auriculis linearibus vel lineari-spathulatis apice obtusis circ. 4 × 1,5 mm marginibus ± glandulosis, apicem versus sensim attenuata, imo apice acutissima, margine serrulata, dentibus glandulosis, 1-nervia vel obscure penninervia, supra praecipue ad basim villosa, infra ad costam sparse setosa. *Inflorescentiae* 2-4-plo folia superantes, 4-6-florae; pedunculi 8-11 cm longi, glabri vel sparse breviterque villosi; prophylla bina, lineari-lanceolata, 1,5 mm longa, ad basim glandulosa; pedicelli fructiferi reflexi, 3-4,5 mm longi. *Calyx* extus sparse setosus; tubus = circ. 2/3 calycis (8 mm), intus in parte 1/3 inferiore albido-pubescens; lobi oblongo-lanceolati, obtusi, circ. 2,5 mm longi. *Petala* flava, calycem duplo superantia. *Filamenta staminum* majorum circ. 8 mm longa, minorum circ. 6 mm longa; antherae 1,3 mm longae. *Ovarium* oblongum, 3 mm longum. *Styli* 7,5 mm longi, apice conspicue lacerati, stamina majora superantes. *Fructus* glaber, reflexus, 2,8 cm longus, circ. 1,5 mm crassus, 2,5 mm longe rostratus, 9-15-spermus. *Semina* matura non vidimus.

Fl. et fr.: Majus.

Ic. nostr. Tab. IV.

Habitat in *Moçambique*, regione *Niassa*, loco dicto *Namina*, 8-V-1948, *Pedro & Pedrógão* 3238 (LMJ, holotypus).

«Erva anual de flores amarelas» (Pedro & Pedrógão).

Affinis W. lobatae Urb. a qua setis caulium albidis usque 1,5 mm longis neque setis brevissimis aureis vel brunnescentibus difficile conspicuis; foliis minoribus basi auriculatis, auriculis linearibus vel lineari-spathulatis neque basi lobulatis, lobulis minimis rotundatis vel anguste-oblongis vel nullis; etc. differt.

Wormskioldia mossambicensis, sp. nov.

Herba perennis usque ad 30 cm alta. *Caules* [illegible]ures ex rhizomate 3-5 mm diam. orti, erecti, dense foliati, usque ad 3 mm crassi, rigidi, striati, glabri et setis destituti saepe a basi

ramosi, ramis virgatis. *Folia* erecta, rigida, siccitate pallide olivacea, linearia, usque ad 15 cm longa et 2 mm lata, inferiora breviora et latiora, omnia sessilia, apice acuta, margine integra vel aliquando basim versus remote denticulata, dentibus brevissimis, utrinque glabra vel supra pilis tenuissimis albidis sparsis praecipue ad basim ornata, costa utrinque prominente. *Inflorescentiae* folia aequantes vel usque duplo superantes saepe 4-florae, pedunculis glabris; prophylla lanceolata, glabra, circ. 2 mm longa; pedicelli striati, 2,5 mm longi, apice breviter setosi, fructiferi leviter incrassati, erecti, glabri. *Calyx* 13,5-18,5 mm longus, extrinsecus sparse setulosus, setis basi dilatatis sed non bulbosis, intus in 5 mm inferioribus pubescens; lobi 3,5-4,5 mm longi, oblongi, exteriores margine anguste hyalini, apice ciliati, interiores latiuscule hyalino-marginati, margine crispo-ciliati, omnes sub apice e dorso denticulo muniti. *Petala* calycem ± duplo superantia, usque ad 35 mm longa, tubo calycis 5 mm longe adnata, superne rhomboideo-obovata ± 10 mm lata, inferne longissime cuneato-angustata, glabra, ligula 1,5 mm longa, dorso adnata, ad apicem libera. *Staminum filamenta* tubo calycis circ. 1 mm longe adnata, glabra, 3 longiora et 2 breviora; antherae oblongae, circ. 2,5 mm longae, dorso in 1/6 alt. affixae. *Styli* apice stigmatifero irregulariter laceri. *Flos brevistylus:* filamenta staminum longiorum 16 mm longa, breviorum 15 mm; styli 8 mm. *Flos longistylus:* filamenta staminum longiorum 12 mm longa, breviorum 11 mm; styli 12 mm longi. *Ovarium* oblongum, 6 × 1 mm, glabrum. *Fructus* erectus, usque ad 6 cm longus et 3,5 mm crassus, apice 5-10 mm longe rostratus, glaberrimus, usque 9-spermus. *Semina* oblonga, 6 × 2 mm, maturitate nigra, arillo stramineo, fere usque ad medium seminis ascendente, seminis 3/4 amplectante.

Fl. et fr.: December.

Ic. nostr. Tab. V.

Habitat in *Moçambique* regione *Inhambane,* inter *Quissico* et *Chiducoane* prope locum dictum *Zavala,* 7-XII-1944, *Mendonça* 3308 (LISC, holotypus).

« Erva vivaz rizomatosa dos campos de cultura abandonados, solo de areias brancas. Flores internamente cor de tijolo intenso, externamente salmão pálido » (F. A. MENDONÇA).

Species satis distincta. Formis non setiferis cum foliis angustissimis W. longipedunculatae Mast. accedit, sed caulibus glabris, foliis fere glabris, inflorescentiis usque 5-floris nec 6-12 (14)-floris, pedunculis brevioribus, pedicellis fructiferis erectis non retroflexis, capsulis glabris usque 3,5 mm nec 1-1,5 mm crassis, seminibus majoribus praecipue differt.

Wormskioldia Schinzii Urb. var. **Schinzii**

Descriptio Cl. Urbani sic amplificanda est:

Herba perennis, 15-40 cm alta. *Folia* usque 22×6 cm. *Flores* heterostyli dimorphi. *Pedicelli* fructiferi setiferi, arcuato-deflexi. *Fructus* densiuscule setifer, cernuus, circ. 2,75 cm longus, 7-spermus, rostro circ. 2 mm.

Specimina visa:

ANGOLA: **Huíla**: Gambos, ad flumen Caculovar, XII-1882, *F. Newton* 26 (COI, isotypus). **Bié**: Cuando-Cubango, X-1949, *Brito Teixeira* 225 (LUA). **Cubango**: unterh. Kabindere, alt. 1150 m, 30-X-1899, *Baum* 344 (BM).

Wormskioldia Schinzii Urb. var. **hirsuta**, var. nov.

A typo caule pilis albidis longis (cum setis intermixtis) dense hirsuto, foliis utrinque densissime pilosis et minus setiferis, laciniis minoribus et obtusis praecipue differt.

Fl. et fr.: November.

Tab. VI.

Habitat in *Moçambique*, regione *Manica e Sofala*, inter *Beira* et *Inhaminga*, 6-XI-1946, *Pedro & Pedrógão* 40 (LMJ, holotypus).

«Erva rizomatosa. Flores alaranjadas» (Pedro & Pedrógão).

Piriqueta capensis (Harv.) Urb.

Descriptiones Cl. Harveyi et Urbani sic amplificandae sunt:

Suffrutex usque ad 1 m altus. *Folia* 2-3×0,6-1,2 cm, glandulis basilaribus 1-4 singulis marginibus instructa. *Flores*

heterostyli dimorphi. *Pedunculi* usque 2,2 cm longi; pedicelli usque 7 mm. *Sepala* usque 12 mm. *Petala* calycem superantia.

Icon. nostr. Tab. VII.

Specimina visa:

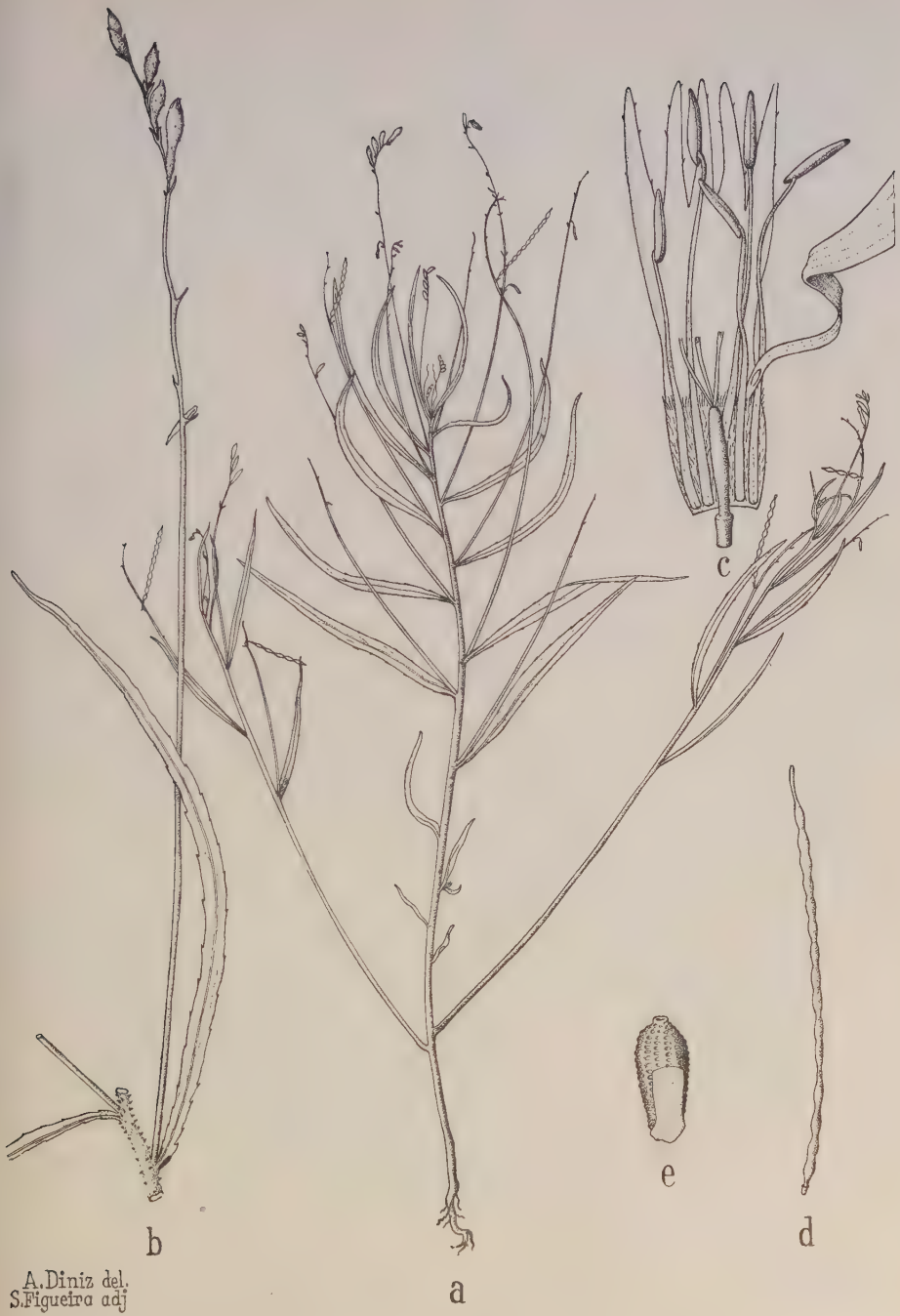
MOÇAMBIQUE: Lourenço Marques, s. d., *Mendonça* s. n. (LISC); Maputo, Goba, 15-XI-1940, *Torre* 2025 (LISC).

Wormskioldia elata A. et R. Fernandes

Specimen *Torre* 1273 (COI, holotypus)

Wormskioldia elata A. et R. Fernandes

Specimen *Torre* 1273 (LISC, isotypus)



Wormskioldia lanceolata A. et R. Fernandes

a) Habitus (×1/4). *b)* Pars caulis cum folia et inflorescentia (×1). *c)* Floris brevistyli calyx explanatus (×4). *d)* Capsula (×1). *e)* Semen (×6).

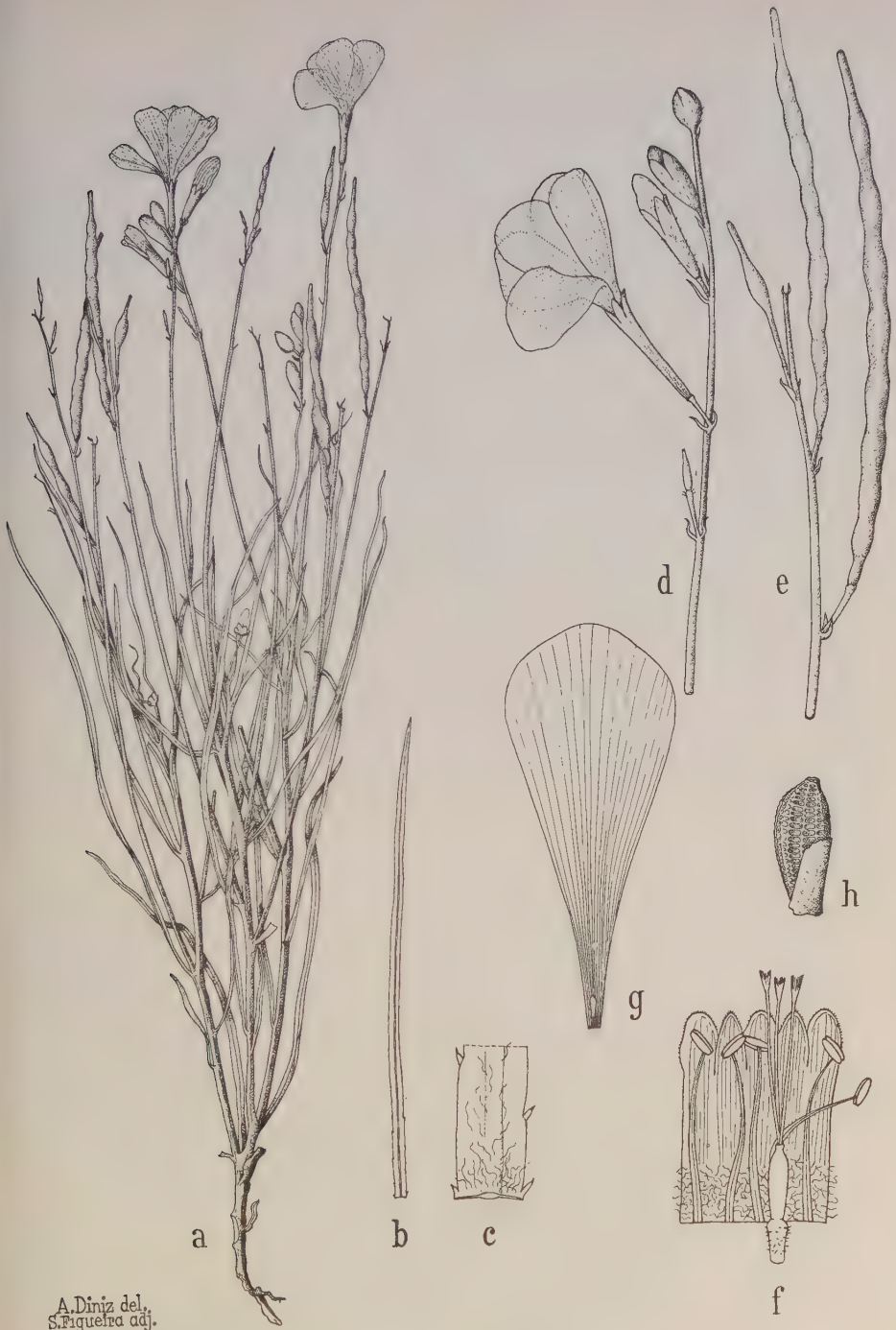
(*Gomes e Sousa* 4222)

A.Diniz del.
S.Figueira adj.

Wormskioldia auriculata A. et R. Fernandes

a) Habitus (×1/6). *b)* Caulis pars superior inflorescentias evolutas duas ostendens (×1,5). *c)* Pars caulis setas ostendens, cum folio et basi pedunculi (×2). *d)* Calyx explanatus cum staminibus, ovario et stylis (×4). *e)* Pars pedunculi cum pedicello arcuato-deflexo et fructo (×3).

(*Pedro & Pedrógão* 3238)



Wormskioldia mossambicensis A. et R. Fernandes

a) Habitus (×0,5). *b)* Folium medianum (×0,5). *c)* Folii basis (×3). *d)* Inflorescentiae pars terminalis (×1). *e)* Pedunculus fructifer (×1). *f)* Calyx explanatus stamina, ovarium et stylos ostendens (×2). *g)* Petalum cum ligula (×2). *h)* Semen cum arillo (×3).

(*Mendonça* 3308)

Wormskioldia Schinzii Urb. var. **hirsuta** A. et R. Fernandes

Specimen *Pedro & Pedrógão* 40 (LMJ, holotypus)

a

c

d

b

e

A.Diniz del.
S.Figueira adj.

Piriqueta capensis (Harv.) Urb.

a) Habitus (×0,5). *b)* Folium (×1,5). *c)* Flos brevistylus explanatus (×3). *d)* Capsula inaperta (×3). *e)* Capsula dehiscens (×3).

(*Mendonça* s. n.)

SUBSÍDIOS PARA O CONHECIMENTO DAS RODOFÍCEAS DE ÁGUA DOCE DE PORTUGAL — II

por

P.e M. PÓVOA DOS REIS (1)

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Os primeiros naturalistas que se ocuparam do estudo do género *Lemanea* em Portugal foram F. Welwitsch e Júlio Henriques. Além destes, há notícia dos colectores F. Newton, A. F. Moller e M. Ferreira.

Welwitsch fez colheitas em Sintra, junto à Fonte de Prata (15-III-1840); nos regatos da dita Serra (III-IV-V-1843); em Alcântara (II-III-1844); na Serra de Monchique e Monte Foia (VI-1847); em Ota e Montejunto (IX-1847); e na Serra da Estrela (Mondeguinho), em 1848. O material deste investigador encontra-se nos Institutos Botânicos de Lisboa e de Coimbra.

Júlio Henriques herborizou duas espécies no rio Tâmega, em Julho de 1878, encontrando-se os exemplares no herbário do Instituto Botânico de Coimbra. Na Expedição Científica à Serra da Estrela, realizada em 1881 sob os auspícios da Sociedade de Geografia de Lisboa, o mesmo investigador colheu alguns exemplares na Ribeira da Candeeira, base do Cântaro Gordo, que então foram determinados como sendo *L. botryophora* Lev. *subtilis* (*vide* J. Henriques, Exped. Scient. Serra da Estrela, secção Bot., 1883).

J. Newton deixou-nos uma colheita efectuada em S.ta Cruz do Bispo, perto do Porto (14-IX-1880), existente no Instituto Botânico de Coimbra.

Do colector Moller há dois exemplares no dito Instituto, sendo um herborizado no rio Mondego, perto de Cabris (III-1879) e outro na Serra da Estrela (VII-1880).

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(1) Bolseiro do Instituto de Alta Cultura.

De M. Ferreira há um exemplar em Coimbra, colhido no rio Mondego, entre Fornos de Algodres e Celorico da Beira (VIII-1885).

A identificação das espécies compreendidas no material acima referido torna-se pràticamente impossível, na maior parte dos casos, sem o auxílio de colheitas recentes nas mesmas localidades. Devemos ao Ex.mo Sr. Director do Instituto Botânico de Coimbra, Prof. Doutor Abílio Fernandes, as excursões de estudo realizadas à Serra da Estrela, Sintra, Beira Alta, Beira Baixa, Alentejo e Algarve, que nos permitiram resolver dificuldades respeitantes a espécies outrora colhidas, e, tanto quanto nos foi possível averiguar, não publicadas, e nos ofereceram a oportunidade para encontrar novas espécies para a flora portuguesa e duas variedades novas para a ciência.

No entanto, o material de Welwitsch, colhido em Ota, Alcântara, Serra de Montejunto, Monchique e Monte de Foia aguarda ainda herborizações *in loco* para ser devidamente interpretado. O mesmo se deve dizer da colheita de I. Newton em S.ta Cruz do Bispo. Trata-se de uma planta muito rudimentar, considerada na etiqueta como nova espécie. Também neste caso é preciso estudar a planta viva e a sua ecologia.

Este breve relato mostra que é necessário continuar a exploração das Rodofíceas de água doce em Portugal.

Cumpre-nos manifestar aqui ao Ex.mo Sr. Director do Instituto Botânico de Coimbra, Prof. Doutor Abílio Fernandes, a nossa viva gratidão pela paciência com que sempre nos tem atendido na resolução dos problemas mais variados e pelo encorajamento na continuação dos nossos estudos.

Ao Ex.mo Sr. Director do Instituto Botânico de Lisboa agradecemos também a amabilidade com que nos facultou os materiais existentes na Instituição que superiormente dirige.

Ao Ex.mo Sr. Prof. Doutor H. Skuja apresentamos a nossa franca homenagem de muita gratidão pelos ensinamentos preciosos que sempre nos tem prodigalizado.

Aos diligentes funcionários do Instituto Botânico de Coimbra, F. Cabral Júnior, Aníbal Sarmento e Aníbal dos Santos, a nossa sincera gratidão pelos auxílios prestados.

Fam. **LEMANEACEAE** Rabenhorst

Género **LEMANEA** Bory

Subgénero **Sacheria** (Sirod.) Ketel (1)

Talo fugaz; filamentos frutíferos cilindróides ou setáceos. Eixo central nu. Braços da cruz axial formados de uma célula dividida em dois ramos parietais. Tubos laterais ou placentários a princípio quatro (2).

Lemanea fluviatilis var. **fluviatilis** (L.) Ag. in Kongl. Vet. Akad. Handl. XXXV: 40, t. 2, fig. 2 (1814). — Kütz., Phyc. Gen.: 322 (1843); Sp. Alg.: 527 (1849); Tab. Phyc. VII: 33, t. 82, fig. a-a''' (1857). — Atkins. in Ann. Bot. IV: 221, t. 9, fig. 52 et 58 (1890). — De Toni, Syll. Alg. IV: 41 (1897). — A. Preda, Fl. Ital. Crypt. I: 402 (1909). — Hamel in Rev. Algol. II: 64 (1925). — Pascher et Schiller in Pascher, Süssw. Fl. Deutsch. Österr. Schw. XI: 195 (1925). — Israels. in Symb. Bot. Upsal. VI: 20 (1942), p. p., excl. syn. *L. rigida* Sirod., *L. fucina* Bory et *L. mamilosa* Kütz.

Conferva fluviatilis L., Sp. Pl.: 1165 (1753).

Chantransia fluviatilis DC., Fl. Franç. II: 50 (1805).

Lemanea coralina Bory in Ann. Mus. Hist. Nat. XII: 183, t. 21, fig. 2 (1808).

Sacheria flaviatilis Sirod. in Ann. Sc. Nat. sér. 5, XVI: 70, t. 1, fig. 7 bis, t. 2, fig. 14, t. 3, fig. 15-19, 21-23, t. 6, fig. 47-50, t. 7, fig. 62-63, t. 8, fig. 81 (1872).

Não vimos a *Pseudochantransia*. Filamentos frutíferos violáceos, enegrecendo após exsicação, densos, até 27 cm, bruscamente (não sempre) adelgaçados na base em pedicelos cilíndricos, simples ou ramosos, setiformes; nós mais salientes na parte superior que na inferior, distantes, nas extremidades

(1) Anat. Untersuch. über *Lemanea*. Diss. Greifswald, 1887.

(2) Em geral, o diâmetro dos filamentos frutíferos deste subgénero, indicado por SIRODOT (*loc. cit.* Est. 8), é sensivelmente menor que o do subgénero *Lemanea*. Nas plantas de Portugal, a diferença de diâmetro dos filamentos frutíferos entre os dois subgéneros não parece tão acentuada.

aproximados. Papilas espermatangíferas geralmente 3 por verticilo. Gonimoblastos nas zonas espermatangíferas e nos entrenós.

Est. I, fig. *a, b.*

Espécimes:

BEIRA LITORAL: Miranda do Corvo, nos riachos de Monte do Caniço, 22-IV-1957, *P. Reis et F. Antunes* 69 (CO.).

BEIRA BAIXA: Ribeira de Jamurge pr. Covilhã, 10-V-1961, *P. Reis et A. Santos* 251 (COI).

Obs.: Israelson (*loc. cit.:* 18), referindo-se à cor de *L. fluviatilis*, diz: «The rule might be formulated thus: the more light the paler colour and the less inclination for blackening in drying».

Ora, no Monte do Caniço, as plantas estavam perfeitamente expostas à luz directa do sol todo o dia e, apesar disso, em Abril, apresentavam uma cor perfeitamente violácea. Por conseguinte, parece-nos que a cor é característica segura de diferenciação específica.

Lemanea fluviatilis var. **constricta,** nov. var.

A typo annulo spermatangifero super constrictiones filamentorum, etc. differt.

Est. I, fig. *c, d.*

Pseudochantransia em tufos difusos de 1-2,2 mm, ramosa na base; ramos alternos ou opostos, geralmente simples. Filamentos frutíferos na base do talo, esverdeados ou vinosos, pedicelados ou sensìvelmente atenuados na parte inferior, geralmente delicados e flageliformes na parte superior. Espermatângios dispostos em anel sobre constrições dos filamentos, particularmente na parte superior.

Espécimes:

BEIRA BAIXA: Fonte do Tio Filipe, na estrada de Gouveia a Manteigas, 8-V-1961, *P. Reis et A. Santos* 234 (COI).

Lemanea ciliata (Sirod.) De Toni, Syll. Alg. IV: 42 (1897). — Hamel in Rev. Algol. II: 65 (1925). — Pascher et Schiller in Pascher, Süssw. Fl. Deutsch. Österr. Schw. XI: 198 (1925).

Sacheria ciliata Sirod. in Ann. Sc. Nat. sér. 5, XVI: 71, t. I, fig. 8-11, 24-25, 51-61 et 82 (1872).

Pseudochantransia de 3-4 mm, em tufos densos, muito ramosa na parte superior; ramificação alterna, excepcionalmente oposta. Filamentos frutíferos esverdeados, insensivelmente atenuados na base ou providos de um curto pedicelo pouco diferenciado. Papilas espermatangíferas verticiladas de 3-8, muito raro perfeitamente distintas.

Espécimes:

ALTO DOURO: Rio Balsemão, junto à estrada de Mesão Frio para Viseu, 1-IV-1960, *P. Reis et A. Nauwerck* 141 (COI).

BEIRA ALTA: Ribeira de Pinhanços, junto à estrada de Celorico para Coimbra, 25-III-1960, *P. Reis et A. Nauwerck* 134 (COI); Ponte Pedrinha pr. Gouveia, 8-V-1961, *P. Reis et A. Santos* 228 (COI); Ribeira do Covão pr. Gouveia, 8-V-1961, *P. Reis et A. Santos* 229 (COI); Ponte das Costeiras pr. freguesia de Aldeias (Gouveia), 8-V-1961, *P. Reis et A. Santos* 230 (COI); Ribeiro do Cabril, 8-V-1961, *P. Reis et A. Santos* 321 (COI); ribeira confluente com a Ribeira do Cabril, 9-V-1961, *P. Reis et A. Santos* 233 (COI).

BEIRA BAIXA: Pampilhosa da Serra, Catraia do Farropo, 24-III-1961, *A. Fernandes, P. Reis et A. Santos* 199 (COI); Ribeira do rio Zêzere pr. Covão da Metade (Serra da Estrela), 9-V-1961, *P. Reis et A. Santos* 241 (COI).

Obs.: A cor dos exemplares de *L. ciliata* encontrados em Portugal afasta-se da indicada por Sirodot. É verde azeitona e não negro-violácea.

Lemanea dichotoma DC., Fl. Franç. II: 50 (1805) var. **dichotoma.**

Lemanea torulosa Kütz., Phyc. Gen.: 26 (1845); Sp. Alg.: 528 (1849); Tab. Phyc. VII: t. 84, fig. 2 (1857).

Sacheria rigida Sirod. in Ann. Sc. Nat. sér. 5, XVI: 72, t. 2, fig. 12-13, t. 8, fig. 86 (1872).

Lemanea fucina var. *rigida* Atkins. in Ann. Bot. IV: 225 (1890).

Lemanea rigida De Toni, Syll. Alg. IV: 42 (1879). — A. Preda, Fl. Ital. Crypt. II: 403 (1909). — Hamel in Rev. Algol. II: 65 (1925). — Pascher et Schiller in Pascher, Süssw. Fl. Deutsch. Osterr. Schw. II: 198 (1925).

Pseudochantransia radicante, de 1-2 mm, ramosa; ramos geralmente alternos na parte inferior, na superior alternos, opostos ou unilaterais. Filamentos frutíferos aparecendo junto à base da *Pseudochantransia* ou, por vezes, nos filamentos radicantes descendentes do talo, alongados até meio metro ou curtos e encurvados, bruscamente atenuados em longo pedicelo na base, simples, muito raro ramificados, muitas vezes flageliformes, alguns reduzidos ao pedicelo. Cor verde azeitona ou acastanhada. Papilas espermatangíferas planas ou proeminentes, verticiladas de 3-7, muitas vezes confluentes.

Est. I, fig. *e*, *f*.

Espécimes:

ALTO DOURO: Serra do Marão, na ribeira entre Padornelo e Mesão Frio, 1-IV-1960, *P. Reis et A. Nauwerck* 139 (COI).

BEIRA LITORAL: Vale da Azenha do Rio pr. Penacova, 4-III-1960, *P. Reis et A. Santos* 126 (COI); Vale do Caneiro pr. Penacova, 20-III-1960, *P. Reis et A. Santos* 130 A (COI); Quinta do Covo pr. Oliveira de Azeméis, 28-III-1960, *P. Reis et A. Nauwerck* 136 (COI); Rio Ceira pr. Semide, 24-IV-1960, *P. Reis* 147 (COI); Ribeira de Lizas pr. Semide, 24-IV-1960, *P. Reis* 148 (COI); Água de Alto, no Souto pr. Vilarinho da Lousã, 24-III-1961, *A. Fernandes, P. Reis et A. Santos* 197 (COI); Pontão de Soladinho, em Ponte de Sótão (Góis), 24-III-1961, *A. Fernandes, P. Reis et A. Santos* 198 (COI).

BEIRA ALTA: Mangualde, na Ribeira da Freixiosa, 26-IV-1960, *P. Reis et A. Santos* 150 (COI); Ribeira de Casais de S. João, 26-IV-1960, *P. Reis et A. Santos* 153 (COI); Rio Ludares, 26-IV-1960, *P. Reis et A. Santos* 154 (COI); Ponte do Cavalo pr. Mangualde, 26-IV-1960, *P. Reis et A. Santos* 155 (COI); Pinheiro de Baixo, no aqueduto da estrada pr. Mangualde, 15-II-1961, *P. Reis et A. Santos* 173 (COI); Ponte da Canharda, entre Fornos de Algodres e Vila Nova de Tavares, 15-II-1961, *P. Reis et A. Santos* 175 (COI); rio Mondego, junto à ponte de

Fornos para Celorico da Beira, 15-II-1961, *P. Reis et A. Santos* 177 (COI); Várzea, entre Fornos de Algodres e Celorico, 15-II-1961, *P. Reis et A. Santos* 179 (COI); riacho entre Vila Boa e Celorico, 15-II-1961, *P. Reis et A. Santos* 180 (COI); rio Mondego, em Ponte Nova pr. Celorico, 16-II-1961, *P. Reis et A. Santos* 181 (COI); Quinta da Gateira (freguesia do Minhocal), entre Celorico e Trancoso, 16-II-1961, *P. Reis et A. Santos* 183 (COI); Ribeiro da Tapada (freguesia de Rio de Mel) pr. Aguiar da Beira, 16-II-1961, *P. Reis et A. Santos* 184 (COI); Barragem da Ribeira de Távora pr. Rio de Mel, 16-II-1961, *P. Reis et A. Santos* 185 (COI); Benvende pr. Rio de Mel, numa ribeira afluente da Ribeira de Távora, 16-II-1961, *P. Reis et A. Santos* 187 (COI); Ribeira de S. João da Carreira pr. Viseu, 16-II-1961, *P. Reis et A. Santos* 189 (COI); Ribeira das Olas pr. Celorico da Beira, 16-II-1961, *P. Reis et A. Santos* 191 (COI).

BEIRA BAIXA: Ribeira a 14 km de Pampilhosa da Serra, na estrada de Coimbra, 24-III-1961, *A. Fernandes, P. Reis et A. Santos* 201 (COI); barragem de um moinho no rio Ocreza, junto à estrada de Castelo Branco a Coimbra, 25-III-1961, *A. Fernandes, P. Reis et A. Santos* 205 (COI); Covão da Metade (Fontes do rio Zêzere), 9-V-1961, *P. Reis et A. Santos* 244 (COI); Ribeira das Penhas da Saúde (Serra da Estrela), 9-V-1961, *P. Reis et A. Santos* 245 (COI).

ALTO ALENTEJO: Na ribeira junto à estrada de Castelo de Vide a Santo António das Areias, 27-III-1961, *A. Fernandes, P. Reis et A. Santos* 213 (COI); Ribeira do Marvão, 27-III-1961, *A. Fernandes, P. Reis et A. Santos* 215 (COI); aqueduto da linha férrea pr. estação de Castelo de Vide, 29-III-1961, *A. Fernandes, P. Reis et A. Santos* 218 (COI); ribeira pr. Vargem (Portalegre), 28-III-1961, *A. Fernandes, P. Reis et A. Santos* 219 (COI).

Obs.: De Candolle (1805, *loc. cit.*) mencionou pela primeira vez esta espécie sob o binome *Chantransia dichotoma*. Em 1808, Bory deu ao género o nome de *Lemanea* (in Ann. Mus. Hist. Nat. XII: 178).

Sirodot, em 1872, substituiu o binome de *L. dichotoma* por *L. rigida* « parce qu'elle ne fait allusion qu'à une forme exceptionnelle de la ramification » *(loc. cit.)*. Como a razão

apresentada não justifica a substituição, a prioridade pertence a De Candolle.

Lemanea dichotoma DC. var. **Viviana** Sirod. in Ann. Sc. Nat. sér. 5, XVI: 73, t. 8, fig. 87, 88 (1872).

Pseudochantransia até cerca de 5 mm de altura; ramificação pouco numerosa, quer lateral, quer fasciculada ou ainda irregular. Filamentos férteis geralmente delicados, bruscamente atenuados na base em longo pedicelo, aparecendo desde as primeiras células basilares até meio do talo. Papilas espermatangíferas verticiladas de 3-7, formando, por vezes, anel sobre os nós tuberculiformes.

Espécimes:

BEIRA BAIXA: Num riacho a cerca de 1,5 km do Poço do Inferno (Serra da Estrela) 9-V-1961, *P. Reis et A. Santos* 236, 237 (COI).

Obs.: Esta variedade difere da seguinte pelos nós tuberculiformes e pela delicadeza dos filamentos frutíferos.

Lemanea dichotoma DC. var. **annuloidis,** var. nov.

A typo frondibus fructiferis annulum antheridiferum ostendentibus, etc. differt.
Est. II, fig. *a*.

Pseudochantransia com cerca de 3 mm de altura; ramificação irregular. Filamentos férteis bruscamente atenuados na base em longo pedicelo, aparecendo desde as primeiras células basilares do talo até à parte superior. Espermatângios formando anel, por vezes interrompido, sobre os nós.

Espécimes:

ALTO DOURO: Fonte da Barrela pr. Mangueija (Marão), 1-IV-1960, *P. Reis et A. Nauwerck* 140 (COI).

Obs.: Esta variedade difere da anterior especialmente pela ausência de nós tuberculiformes e pela constância do anel espermatangífero.

Lemanea sudetica Kütz., Sp. Alg.: 528 (1849); Tab. Phyc. VII: t. 85, fig. 1 (1857). — De Toni, Syll. Alg. IV: 44 (1897). — A. Preda, Fl. Ital. Crypt. I: 404 (1909). — Pascher et Schiller in Pascher, Süssw. Fl. Deutsch. Österr. Schw. XI: 198, fig. 73, 74 (1925).

Lemanea Kalchbrenneri Rabenh., Alg. n. 834, fide De Toni.

Lemanea Daldinii Rabenh., Alg. n. 697, Erb. Critt. Ital. n. 136, fide De Toni *(loc. cit.)*.

Não vimos a *Pseudochantransia*. Filamentos frutíferos até 32 cm, bruscamente adelgaçados na base em curto pedicelo, acastanhado-escuros e consistentes na parte inferior, esverdeados e flexíveis como borracha na parte superior ou rigídulos e de cor verde azeitona, pouco ramificados. Nós pouco salientes e afastados. Papilas espermatangíferas irregularmente distribuídas.

Est. II, fig. *b, c*.

Espécimes:

BEIRA ALTA: Seia, num ribeiro junto à Fonte do Marrão, 11-IV-1961, *L. C. Martins* 1 (COI).

ALTO ALENTEJO: Num ribeiro pr. Vargem (Portalegre), 28-III-1961, *A. Fernandes, P. Reis et A. Santos* 221 (COI).

Lemanea fucina Bory in Ann. Mus. Hist. Nat. XII: 185, t. 21, fig. 3 (1808). — Atkins. in Ann. Bot. IV: 222 (1890) p. p. quoad syn. *L. fucina* Bory. — De Toni, Syll. Alg. IV: 43 (1897). — A. Preda, Fl. Ital. Crypt. I: 403 (1909). — Hamel in Rev. Algol. II: 66 (1925). — Pascher et Schiller in Pascher, Süssw. Fl. Deutsch. Österr. Schw. XI: 198, fig. 77, 78 (1925).

Lemanea mamilosa var. *fucina* Kütz., Sp. Alg.: 528 (1949).

Sacheria fucina Sirod. in Ann. Sc. Nat. sér. 5, XVI: 74, t. 3, fig. 20, t. 8, fig. 83 (1872).

Lemanea fluviatilis Israels. in Symb. Bot. Upsal. VI: 20 (1842) p. p. quoad syn. *L. fucina* Bory, non Ag.

Não vimos a *Pseudochantransia*. Filamentos frutíferos em pequenos tufos, raros, de 5-12 cm, verde-escuros, muitas vezes insensivelmente atenuados na base, bastante ramosos; últimos ramos longos, flageliformes. Papilas espermatangíferas pouco salientes, em geral 3 por verticilo, reduzidas a 1 ou 2 nos últimos ramos. Gonimoblastos ao longo dos filamentos.

Est. II, fig. *d*.

Espécimes:

BEIRA BAIXA: Ribeira da margem direita do rio Tejo junto das Portas de Ródão, 26-III-1961, *A. Fernandes, P. Reis et A. Santos* 211 (COI).

Obs.: A espécie não muda de cor com o formol a 2,5%-3%, ao contrário da espécie seguinte que adquire cor vinosa.

Lemanea mamillosa Kütz., Sp. Alg.: 528 (1849); Tab. Phyc. VII: 33, t. 83, fig. 2 (1857). — De Toni, Syll. Alg. IV: 43 (1897). — Hamel in Rev. Algol. II; 67, fig. 7 (1925). — Pascher et Schiller in Pascher, Süssw. Fl. Deutsch. Österr. Schw. XI: 200, fig. 75-76 (1925).

Sacheria mamillosa Sirod. in Ann. Sc. Nat. sér. 5, XVI: 75, fig. 7 et 84 (1872).

Lemanea fucina var. *mamillosa* Atkins. in Ann. Bot. IV: 225, t. 7, fig. 1-5, 8-9 et 11-18 (1890).

Lemania fluviatilis Israels. in Symb. Bot. Upsal. VI: 20 (1942) p. p. quoad syn. *L. mamillosa* Kütz., non Ag.

Pseudochantransia nascendo de um tecido reptante mamiloso e formando tufos densos de cerca de 4-6 mm de altura; filamentos caulinares mais desenvolvidos (diâm. 15-36 μ), levemente ondulados, tendendo a formar feixes, ramificados alternadamente ou nus como os ramos primários na parte inferior; na parte superior uns e outros com ramificação abundante, emaranhada, frequentemente unilateral; últimos ramúsculos unilaterais ou irradiando em todos os sentidos. Ramo frutífero confinado à base do talo ou até cerca de um terço do mesmo.

Filamentos frutíferos de 20-48 cm, castanho-escuros, em céspedes muito densas e extensas, insensivelmente atenuados

na base, os maiores frequentemente pedicelados, levemente ondulados, tendendo a formar feixes muito ramosos; ramos capilares na parte superior; entrenós alongados. Papilas espermatangíferas 2-4, proeminentes, mamilosas, sobretudo nos ramos superiores, por vezes confluentes, dispostas em verticilos.

Est. II, fig. *e*, *f*.

Espécimes:

ESTREMADURA: Ribeira de Sintra, junto à Fonte de Prata, 15-III-1840, *s. col.*, s. n. (COI); nos riachos rapidíssimos da Serra de Sintra, abaixo do Castelo, sobre pedras submersas, IV-V-1843, *Welwitsch* s. n. (COI); no riacho de Monserrate (Sintra), 29-III-1961, *P. Reis et A. Santos* 223 (COI).

Obs.: ATKINSON (*loc. cit.:* Est. IX, fig. 60) indica frutificação limitada aos nós. Nos nossos exemplares, os gonimoblastos encontram-se também nos entrenós.

Subgénero **Lemanea**

Eixo central envolvido por filamentos descendentes em espiral. Células da cruz axial cilindróides, unidas ao tecido cortical mediante uma célula piriforme e produzindo 6-8 filamentos laterais internos.

Lemanea catenata Kütz., Sp. Alg.: 528 (1849); Tab. Phyc. VII: t. 84, fig. 1 (1857). — Sirod. in Ann. Sc. Nat. sér. 5, XVI: 80, t. 5, fig. 40, t. 8, fig. 78 (1872). — Atkins. in Ann. Bot. IV: 215, t. 9, fig. 45-49 (1890). — De Toni, Syll. Alg. IV: 37 (1897). — A. Preda, Fl. Ital. Crypt. I: 400 (1909). — Hamel in Rev, Algol. II: 62 (1925). — Pascher et Schiller in Pascher, Süssw. Fl. Deutsch. Österr. Schw. XI: 201, fig. 80-82 (1925).

Pseudochantransia em tufos densos, de 1,5-3 mm; filamentos radicantes numerosos. Ramificação corimbiforme. Elementos caulinares com ramos alternos, raramente opostos na base; ramos primários nus inferiormente; na parte superior a princípio alternos e depois geralmente unilaterais. Diâmetro dos ramos inferiores: na base, 13,32-16,65 μ; na parte média,

16,65-23,3 μ. Comprimento das células 65,5-100 μ. Filamentos frutíferos aparecendo na base dos elementos caulinares dos ramos primários, algumas vezes junto de ramúsculos divaricados, um tanto curvos, excepcionalmente ramosos. Nós pouco extensos, sensivelmente angulosos. Anel espermatangífero estreito até 150 μ, raro nas extremidades, até 300 μ, irregular, pouco interrompido. Entrenós por fim cilindróides.

Est. III, fig. *a, b.*

Espécimes:

BEIRA LITORAL: Vale do Caneiro (estrada da Beira), 20-III-1960, *P. Reis* 130 (COI).

BEIRA ALTA: Vila Corça pr. Viseu, no rio Dão, 31-VII-1959, *L. Pereira* 1 (COI); Ponte Pedrinha pr. Gouveia, 8-V-1961, *P. Reis et A. Santos* 227 (COI); Ribeira de Salgueirais, em Cortiçô da Serra (Celorico), 10-V-1961, *P. Reis et A. Santos* 259 (COI); Cova do Mondego, pr. Guarda, 10-V-1961, *P. Reis et A. Santos* 257 (COI).

BEIRA BAIXA: Túnel de Loriga para a Lagoa Comprida (Serra da Estrela) 29-VI-1960, *P. Reis et A. Santos* 169 A (COI); Ponte de S. Gens em Idanha-a-Nova (Ribeira de Alfriade), 25-III-1961, *A. Fernandes, P. Reis et A. Santos* 208 (COI).

Obs.: Lemanea catenata apresenta por vezes um anel espermatangífero muito mais largo do que Sirodot indica e os entrenós nem sempre são fortemente acentuados, como menciona Hamel (*loc. cit.:* 57). *Vide* nossa fot. Est. III, fig. *a* e *b* e a fig. de Sirodot (*loc. cit.:* N.º 76).

Lemanea catenata Kütz. f. **incurvata** Sirod. in Ann. Sc. Nat. sér. 5, XVI: 80 (1872).

Filamentos curtos e encurvados.

Espécimes:

ALTO ALENTEJO: Ribeira a 5,5 km de Montemor-o-Novo, junto à estrada para Lisboa, 29-III-1961, *P. Reis et A. Santos* 222 (COI).

Lemanea torulosa (Roth) Ag. in Kongl. Vet. Akad. Handl. XXXV: 40 (?), t. 2, fig. 1 (1814). — Sirod. in Ann. Sc. Nat. sér. 5, XVI: 82, t. 1, fig. 5, t. 8, fig. 77 (1872). — Atkins. in Ann. Bot. IV: 217, t. 9, fig. 51 (1890). — De Toni, Syll. Alg. IV: 39 (1897). — Hamel in Rev. Algol. II: 61, fig. 10-K, 11 N.º 5 (1925). — A. Preda, Fl. Ital. Crypt. I: 399, fig. 124 (1909). — Pascher et Schiller in Pascher, Süssw. Fl. Deutsch. Österr. Schw. XI: 201, fig. 83 (1925). Non *L. torulosa* Kütz.

Chantransia torulosa DC., Fl. Franç. II: 50 (1805).
Lemanea incurvata Bory p. p. in Ann. Mus. Hist. Nat. XII: 181, t. 21, fig. 1 (1808).

Pseudochantransia em tufos densos de 1,5-2,7 mm, com filamentos radicantes muito numerosos. Ramificação geral alterna, com os ramos formando ângulos muito agudos com os eixos principais, dispostos em pincel; ramos primários geralmente alternos, por vezes opostos; ramos frutíferos divaricados, constituídos por células curtas. Filamentos frutíferos até 15 cm, de superfície levemente ondulada. Cor olivácea. Nós pouco salientes. Zona espermatangífera formando um anel estreito até 150 μ, raro nas extremidades até 300 μ, na parte média dos nós, irregular, frequentemente interrompido.

Est. III, fig. c.

Espécimes:

BEIRA BAIXA: Ribeira de Mação, IV-1957, *P. Reis* 3 (COI); Vila Velha de Ródão, na ribeira de Açafal, 26-III-1961, *A. Fernandes, P. Reis et A. Santos* 209 (COI).

Lemanea annulata Kütz., Sp. Alg.: 528 (1849); Tab. Phyc. VII: t. 84, fig. 1 (1857). — Sirod. in Ann. Sc. Nat. sér. 5, XVI: 80, t. 5, fig. 40 et 78 (1872). — Atkins. in Ann. Bot. IV: 215, t. 9, fig. 45 et (1890). — De Toni, Syll. Alg. IV: 37 (1897). — A. Preda, Fl. Ital. Crypt. I: 401 (1909). — Hamel in Rev. Algol. II: 60, fig. 10-L (1925). — Pascher et Schiller in Pascher, Süssw. Fl. Deutsch. Österr. Schw. XI: 201, fig. 82 (1925) (1).

(1) A fig. 80 de PASCHER et SCHILLER *(loc. cit.)* corresponde a *L. catenata* em SIROD. *(loc. cit.)* e não a *L. annulata*.

Pseudochantransia em tufos cespitulosos de 1,5-4 mm, provenientes de filamentos radicantes; ramificação primária basilar, alterna ou oposta; ramúsculos das extremidadas fasciculados e divergentes. Ramos frutíferos geralmente terminais, na extremidade do eixo principal ou dos ramos primários, sempre aproximados da base do talo. Filamentos frutíferos de 8-15 cm, verde-acastanhados ou negro-violáceos, simples, excepcionalmente ramosos. Nós regularmente fusiformes, raro elipsoidais. Superfície espermatangífera em forma de largo anel até 450 μ, raro, nas extremidades, até 500 μ, de que frequentemente resta o local assinalado pelo tecido basilar dos espermatângios mergulhado na camada cortical.

Est. III, fig. *d*.

Espécimes:

BEIRA LITORAL: Água de Alto, no Souto pr. Vilarinho da Lousã, 24-III-1961, *A. Fernandes, P. Reis et A. Santos* 197 A (COI).

BEIRA ALTA: Rio Ludares (Castendo), 26-IV-1960, *P. Reis et A. Santos* 154 A (COI); rio Coja, perto da foz, 26-IV-1960, *P. Reis et A. Santos* 157 (COI); Ponte de Nelas, no rio Mondego, 13-VII-1960, *B. Neves, E. Rodrigues et A. Santos* 1 (COI); ribeira de Pomares, 13-VII-1960, *B. Neves, E. Rodrigues et A. Santos* 2 (COI).

BEIRA BAIXA: Rio Ocreza, junto à estrada de Castelo Branco a Coimbra, 25-III-1961, *A. Fernandes, P. Reis et A. Santos* 204 (COI); riacho afluente do rio Ocreza pr. Castelo Branco, 25-III-1961, *A. Fernandes, P. Reis et A. Santos* 203 (COI); ribeira de Açafal pr. Vila Velha de Ródão, 26-III-1961, *A. Fernandes, P. Reis et A. Santos* 209 A (COI).

ALTO ALENTEJO: Ribeira pr. Vargem (Portalegre), 28-III-1961, *A. Fernandes, P. Reis et A. Santos* 220 (COI).

Lemanea annulata Kütz. f. **capillacea** Sirod. in Ann. Sc. Nat. sér. 5, XVI: 81 (1872).

Filamentos capilares com nós quase cilíndricos.

Est. III, fig. *e*.

Espécimes:

BEIRA LITORAL: Ribeira de Ribas pr. Poiares, 15-V-1960, *P. Reis* 143 (COI); valeta da estrada de Penacova a Poiares, V-1960, *E. Rodrigues et A. Santos* 3 (COI).

BEIRA BAIXA: Alto da Lomba da Légua, na estrada de Castelo Branco a Coimbra, 22-VI-1959, *A. Fernandes, J. Matos et F. Cardoso* 1 (COI); rio de Unhais-o-Velho (Pampilhosa da Serra), 19-IV-1960, *Pinto de Almeida* 1 (COI); ribeira do Freixial, afl. do rio Ocreza, 25-III-1961, *A. Fernandes, P. Reis et A. Santos* 206 (COI).

Lamanea nodosa Kütz., Tab. Phyc. VII: 34, t. 87, fig. 2 (1857). — Sirod. in Ann. Sc. Nat. sér. 5, XVI: 83, t. 1, fig. 6-6 bis, t. 8, fig. 75, 79, 80 (1872) — De Toni, Syll. Alg. IV: 38 (1897). — A. Preda, Fl. Ital. Crypt. I: 400 (1909). — Hamel in Rev. Algol. II: 61 (1925). — Pascher et Schiller in Pascher, Süssw. Fl. Deutsch. Österr. Schw. XV: 201 (1925).

Pseudochantransia de 1,5-4 mm, piramidal; ramificação alterna ou oposta desde a base; diâmetro do eixo principal 22 μ e o dos ramos primários 16 ; por vezes feixes de ramos secundários provenientes de uma célula inicial curta.

Filamentos frutíferos negro-violáceos, inseridos até dois terços de altura da *Pseudochantransia*, grossos, longos, fortetemente atenuados na base. Nós ovóides ou elipsóides, separados por um adelgaçamento curto e profundo. Superfície espermatangífera em forma de anel até 450 μ, raro até 500 μ, nas extremidades.

Est. III, fig. *f*.

Espécimes:

BEIRA LITORAL: Ribeira das Donas pr. Semide (Coimbra), 22-IV-1960, *P. Reis et F. Bastos* 145 (COI).

BEIRA ALTA: Várzea entre Fornos de Algodres e Celorico da Beira, 15-II-1961, *P. Reis et A. Santos* 179 (COI); Ponte da Canharda, entre Fornos de Algodres e Vila Cova de Tavares, 15-II-1961, *P. Reis et A. Santos* 195 (COI); rio Mondego, na ponte entre Fornos de Algodres e Celorico da Beira, 15-II-1961,

P. Reis et A. Santos 196 (COI); ribeira das Olas pr. Celorico, 16-II-1961, *P. Reis et A. Santos* 182 (COI); rio Mondego, na Ponte Nova entre Celorico e Trancoso, 16-II-1961, *P. Reis et A. Santos* 225 (COI); ribeira da Lageosa pr. Celorico da Beira, 10-V-1961, *P. Reis et A. Santos* 258 (COI).

ESTAMPAS

Estampa I

Lemanea fluviatilis (L.) Ag. var. **fluviatilis**

a) Parte superior de um filamento frutífero com papilas espermatangíferas um tanto salientes. × 12.
Espécime *P. Reis et F. Antunes* 69.

b) Parte inferior do mesmo filamento com as papilas pouco salientes e afastadas. × 12.

Lemanea fluviatilis (L.) Ag. var. **constricta** P. Reis

c) Filamento frutífero com os espermatângios dispostos em anel sobre constrições do talo. × 12.
Espécime *P. Reis et A. Santos* 234.

d) Extremidade do mesmo filamento visto por transparência. × 20.

Lemanea dichotoma DC.

e) Parte superior de um filamento frutífero com papilas espermatangíferas salientes. × 12.

f) Secção transversal do entrenó do mesmo. × 65.

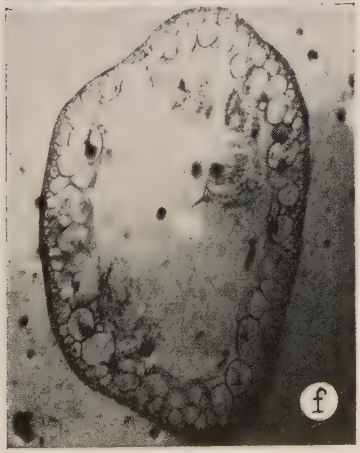
a

b

c

d

e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ESTAMPA I

Lemanea fluviatilis (L.) Ag. var. **fluviatilis**

a) Parte superior de um filamento frutífero com papilas espermatangíferas um tanto salientes. × 12.
Espécime *P. Reis et F. Antunes* 69.

b) Parte inferior do mesmo filamento com as papilas pouco salientes e afastadas. × 12.

Lemanea fluviatilis (L.) Ag. var. **constricta** P. Reis

c) Filamento frutífero com os espermatângios dispostos em anel sobre constrições do talo. × 12.
Espécime *P. Reis et A. Santos* 234.

d) Extremidade do mesmo filamento visto por transparência. × 20.

Lemanea dichotoma DC.

e) Parte superior de um filamento frutífero com papilas espermatangíferas salientes. × 12.

f) Secção transversal do entrenó do mesmo. × 65.

a
b
c
d
e
f

Estampa II

Lemanea dichotoma var. **annuloidis** P. Reis

a) Filamento frutífero com os espermatângios dispostos em anel. × 20.
Espécime *P. Reis et A. Nauwerck* 140.

Lemanea sudetica Kütz.

b) Secção transversal do entrenó da extremidade de um filamento frutífero, vendo-se fascículos de carposporângios que ocupam toda a parte interior do talo. × 65.
Espécime *L. C. Martins* 1.

c) Porção de talo com os nós pouco salientes. × 12.

Lemanea fucina Bory

d) Filamento frutífero ramificado com uma ou duas papilas espermatangíferas nos nós dos ramúsculos. × 12.
Espécime *A. Fernandes, P. Reis et A. Santos* 211.

Lemanea mamillosa Kütz.

e) Jovem filamento frutífero muito ramificado. × 12.
Espécime *P. Reis et A. Santos* 223.

f) *Pseudochantransia*, muito ramificada na parte superior, com um filamento frutífero a cerca de um terço da altura (seta). × 12.
Espécime *P. Reis et A. Santos* 223.

a
b
c
d
e
f

Estampa III

Lemanea catenata Kütz.

a) Filamento frutífero jovem, em que os entrenós apresentam o aspecto de dois troncos de cone, geralmente desiguais, unidos pela secção menor. × 12.
Espécime *P. Reis* 130.

b) Porção de talo adulto com os nós sensìvelmente angulosos e os entrenós cilindróides. × 12.
Espécime *L. Pereira* 1.

Lemanea torulosa (Roth) Ag.

c) Talo com a superfície longamente ondulada e o anel espermatangífero estreito e muito irregular. × 12.
Espécime *A. Fernandes, P. Reis et A. Santas* 209.

Lemanea annulata Kütz.

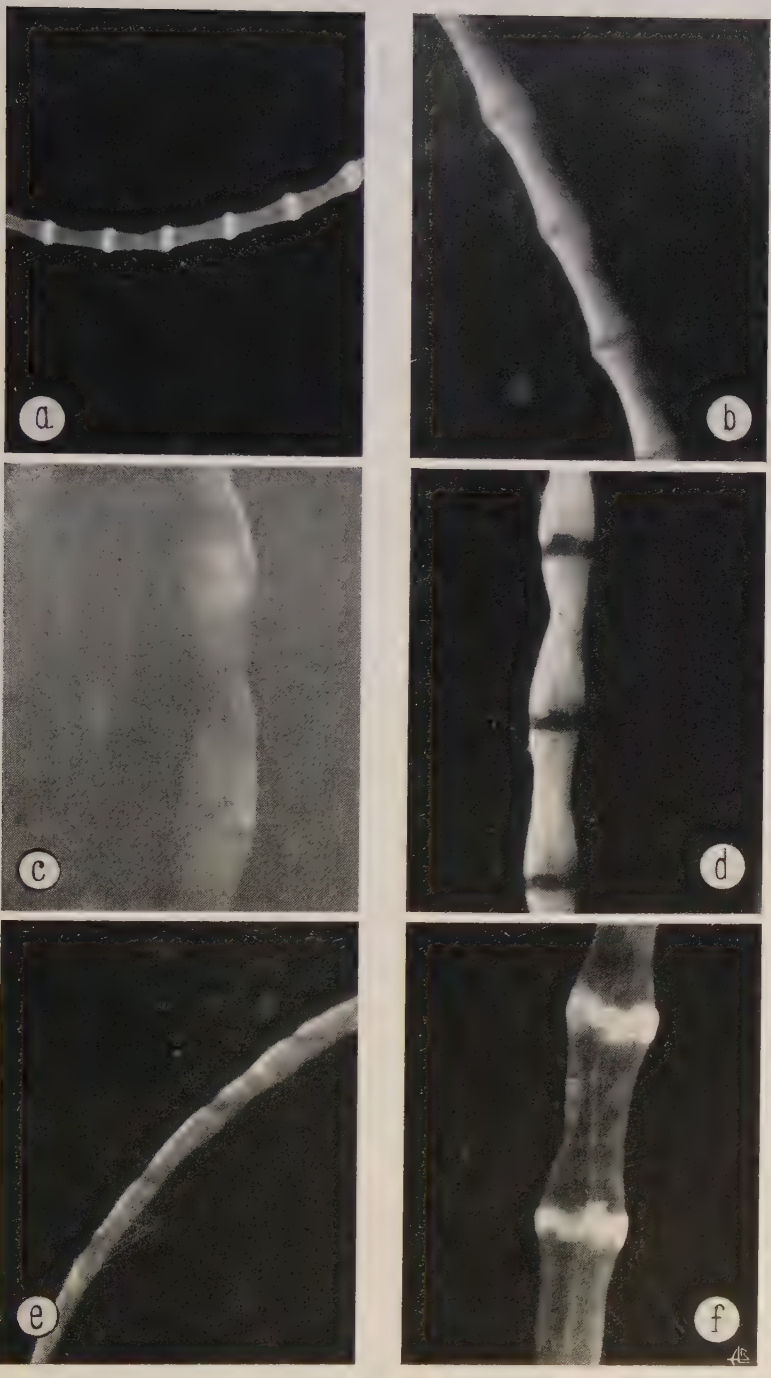
d) A foto apresenta três nós fusiformes com anel espermatangífero de 450 μ, bastante regular. × 12.
Espécime *A. Fernandes, P. Reis et A. Santos* 197 A.

Lemanea annulata Kütz. f. **capillacea** Sirod.

e) Filamento frutífero com nós quase cilíndricos e os anéis espermatangíferos assinalados pelo tecido basilar dos espermatângios mergulhado na camada cortical. × 12.
Espécime *P. Reis* 143.

Lemanea nodosa Kütz.

f) Porção de um filamento frutífero com anel espermatangífero irregular, de 450 μ. × 12.
Espécime *P. Reis et F. Bastos* 145.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CONTRIBUIÇÃO PARA O CONHECIMENTO DAS ALGAS DE ÁGUA DOCE DE PORTUGAL

por

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SE é certo poder afirmar-se que existe na actualidade um conhecimento bastante completo da flora vascular de Portugal, são, pelo contrário, relativamente escassos os conhecimentos que possuímos sobre as plantas celulares.

Pelo que se refere em particular às Algas e muito embora possuindo boas informações sobre uma ou outra família — p. ex. Desmidiáceas e Oedogoniáceas — o seu próprio inventário está por fazer. Ainda mesmo nos grupos melhor estudados, em consequência dos investigadores que deles se têm ocupado não terem podido dispor de colheitas provenientes de todo o país e realizadas em diferentes épocas do ano, não é raro encontrar-se uma ou outra novidade, ou, pelo menos, obter informações que permitam alargar a área de distribuição de espécies já anteriormente conhecidas de outras localidades.

Com o intuito de, na medida das nossas forças e possibilidades, contribuir para um mais completo conhecimento da flora algológica de Portugal, referimos a seguir os resultados do estudo de algumas colheitas de Algas de água doce que efectuámos na região de Coimbra e em várias localidades do distrito de Aveiro.

As colheitas foram realizadas seguindo a técnica habitual, sendo o material fixado e conservado em formol neutro a 5 %. Os organismos do plâncton foram recolhidos com uma rede possuindo cerca de 10 000 malhas por cm^2, sendo do mesmo modo conservados e fixados em água formolada.

EUGLENOPHYTA

EUGLENACEAE

Phacus orbicularis Hübner

Células de contorno orbicular, com uma cauda curta curvada para a direita (em vista ventral), largamente arredondado na parte anterior; periplasto com finas estrias longitudinais; flagelos do comprimento do corpo; grânulos de paramilo 2, em forma de disco. Células com 39-45 μ de largura e 60-100 μ de comprimento (Est. I, fig. 1).

BEIRA LITORAL: Cacia, margem da estrada nacional n.º 16 num charco temporário, raro, 21-IV-1958, *Mesquita Rodrigues & A. Santos* B-589 a (COI).

P. orbicularis é um organismo do plâncton muito frequente na Europa, América do Norte, Ásia e África do Sul.

Trachelomonas volvocina Ehrenberg

Lórica globosa com 16-32 μ de diâmetro (nos nossos exemplares com 13-15 μ). Poro com ou sem espessamento anular e por vezes com um colar muito baixo. Membrana lisa, incolor, amarelada ou castanho-amarelada. Cromatóforos 2, com um pirenóide. Flagelo tendo 2-3 vezes o comprimento do corpo (Est. I, fig. 2).

BEIRA LITORAL: Coimbra, Jardim Botânico, num tanque, abundante, 26-IX-1955, *Mesquita Rodrigues* 300 (COI).

PYRROPHYTA

DINOCOCCACEAE

Cystodinium Steinii Klebs

Células em forma de crescente, com a margem dorsal mais fortemente convexa do que a ventral; ápices terminando em ponta recurvada e enrolada, formando ângulos diferentes com o eixo longitudinal da célula. Células com 25-55 μ de diâmetro e 65-100 μ de comprimento (Est. I, fig. 3).

BEIRA LITORAL: Cacia, margem da estrada nacional n.º 16, num charco temporário de água ácida, raríssimo, *Mesquita Rodrigues & A. Santos* B-589 b (COI).

CHRYSOPHYTA

VAUCHERIACEAE

Vaucheria sessilis (Vaucher) De Candolle

Planta aquática ou terrestre; filamentos de 50-130 μ de diâmetro com ramificação irregular; monóica; oogónios normalmente aos pares (às vezes solitários), sésseis ou com um pedículo muito curto, subglobosos, ovóides ou oblongo-ovóides, com 70-85 × 75-100 μ, mais ou menos oblíquos; anterídio com cerca de 25 μ de diâmetro, ligado ao filamento por um curto pedículo, situado entre os dois oogónios, direito ou circinado mas normalmente com a abertura dirigida para o poro de um dos oogónios; oósporo enchendo completamente o oogónio (Est. I, fig. 4, 5).

BEIRA LITORAL: Cacia, margem da estrada nacional n.º 16, nos charcos, abundante, 21-IV-1958, *Mesquita Rodrigues & A. Santos* B-589 c (COI).

Esta espécie, largamente distribuída na Europa, Estados Unidos e Austrália tem sido herborizada em Portugal em diferentes localidades, parecendo ser frequente entre nós.

CHLOROPHYTA

VOLVOCACEAE

Eudorina elegans Ehrenberg

Colónias móveis, esféricas ou ovadas, com 16-32 células ovóides incluídas em invólucro gelatinoso; células dispondo-se em geral à periferia do invólucro, mas, por vezes, comprimidas para o interior. Células com 10-24 μ de diâmetro. Colónia com 50-200 μ de diâmetro e normalmente com 32 células (Est. I, fig. 6).

BEIRA LITORAL: Cacia, margem da estrada nacional n.º 16, num charco temporário, abundante, 21-IV-1958, *Mesquita Rodrigues & A. Santos* B-589 d (COI).

E. elegans é uma forma comum do euplâncton, que apresenta uma grande amplitude de variação no tamanho e forma das colónias.

Volvox tertius A. Meyer

Colónias esféricas ou elipsóides relativamente pequenas, com 400-2500 células, ovóides ou elipsóides sem conexões protoplásmicas entre elas. Bainhas das células confluentes com o invólucro da colónia, às vezes muito pouco evidentes. Células contendo um único cloroplasto em forma de taça ou de câmpanula, com um pirenóide; estigma nítido; Cílios 2, de comprimento igual a 2-3 vezes o diâmetro da célula. Colónias maduras contendo 3-12 colónias-filhas. Colónias dióicas mas com anterídios ou oogónios sòmente observáveis nas colónias jovens. Anterídios (20-60 em cada colónia) produzindo, cada um, cerca de 64 anterozóides. Colónias femininas com 6-10 oosferas. Zigotos com 58-66 μ de diâmetro, de parede espessa, lisa. Células vegetativas com 5-8 μ de diâmetro. Colónias 50-590 μ de diâmetro (Est. II, fig. 1, 2).

BEIRA LITORAL: Cacia, margem da estrada nacional n.º 16, num charco temporário, relativamente abundante, 21-IV-1958, *Mesquita Rodrigues & A. Santos* B-589 e (COI).

TETRASPORACEAE

Tetraspora lubrica (Roth) C. A. Agardh

Talo a princípio tubular ou em forma de saco e fixado, tornando-se depois laciniado, irregularmente expandido e flutuante. Células em grupos de 4 ou, quando velhas, irregularmente espalhadas no seio de uma mucilagem firme. Células de 7-11 μ de diâmetro (Est. II, fig. 3).

BEIRA LITORAL: Cacia, margem da estrada nacional n.º 16, nos charcos, abundante, 21-IV-1958, *Mesquita Rodrigues & A. Santos* C-589 a (COI).

T. lubrica aparece flutuando nas águas dos charcos ou ligada a macrófitas aquáticas.

ULOTRICHACEAE

Ulothrix zonata (Weber & Mohr) Kützing

Células vegetativas curtas ou cilíndrico-alongadas, às vezes intumescidas, com 25-35 × 22-60 μ. Parede das células espessa, especialmente próximo da base dos filamentos. Cloroplasto em banda, situado na região média da célula, com vários pirenóides (Est. II, fig. 4, 5).

BEIRA LITORAL: Coimbra, Porto dos Bentos, margem direita do Mondego, num charco, abundante, 30-IV-1955, *A. Santos* 322 a (COI).

MICROSPORACEAE

Microspora Loefgrenii (Nordstedt) Lagerheim

Parede espessa (2,5 μ), com as junturas de duas peças em H consecutivas evidentes na região média das células. Células cilíndricas, com 15-20 μ de diâmetro, 3/4 a 2 vezes mais compridas (18-40 μ) do que largas. Cloroplasto reticular, revestindo aproximadamente toda a parede celular. Núcleo indistinto com 5-6,5 μ de diâmetro (Est. II, fig. 6, 7).

BEIRA LITORAL: Avanca, margens do rio Gonde, nos charcos, muito abundante, 21-IV-1958, *Mesquita Rodrigues & A. Santos* A-590 a (COI).

M. Loefgrenii, que, ao que conseguimos averiguar, é o primeiro representante do género a ser citado para Portugal, foi colhida entrelaçada com os caules e pecíolos de macrófitas aquáticas.

OEDOGONIACEAE

Oedogonium pisanum Wittrock

Macrândrico, dióico; oogónio 1 (raramente 2-3), elipsóide-ovóide, abrindo por um opérculo situado superiormente; oósporo ovóide ou elipsóide, liso, enchendo o oogónio; ante-

rídios 1-4, produzindo 2 anterozóides em cada célula anteridial mediante uma divisão horizontal; célula basal alongada e a terminal piliforme. Dimensões: células vegetativas 4-12 × 12-72 μ; oogónio 23-29 × 32-43 μ; oósporo 21-28 × 27-40 μ; anterídios 4-9 × 5-9 μ (Est. III, fig. 13).

BEIRA LITORAL: Cacia, margem da estrada nacional n.º 16, num charco temporário, abundante, 21-IV-1958, *Mesquita Rodrigues & A. Santos* B-589 f (COI).

Esta espécie, que se reconhece fàcilmente pela forma do oósporo e pela existência de uma célula terminal piliforme, encontra-se nos Estados Unidos, na África e na Europa (Áustria, Espanha e Itália).

Em Portugal foi herborizada por LACERDA (Port. Acta Biol. sér. B, II: 71, 1946) em Óbidos, onde a colheu frutificada em Junho, tendo-a nós encontrado em frutificação já em Abril.

ZYGNEMATACEAE

Spirogyra Teodoresci Transeau

Células vegetativas com 24 (25-28)-30 × 42 (50-75)-90 μ; um cromatóforo com 1-6 voltas; conjugação lateral e escalariforme; tubos de conjugação formados por ambos os gametângios; células férteis fortemente intumescidas no lado em que se forma o tubo; zigósporos elipsóides com (24) 26-(28) 33 × × (40) 45-(46) 55 μ; parede mediana do esporo amarela, lisa (Est. III, fig. 9).

BEIRA LITORAL: Cacia, margem da estrada nacional n.º 16, num charco temporário, relativamente abundante, 21-IV-1958, *Mesquita Rodrigues & A. Santos* B-589 g (COI).

S. Teodoresci, que fàcilmente se confunde com *S. varians* (Hassal) Kützing, da qual tem sido, por muitos autores, considerada uma variedade, era conhecida dos Estados Unidos, China e Roménia, sendo agora pela primeira vez citada para Portugal.

Spirogyra tenuissima (Hassall) Kützing

Células vegetativas com 8-15 × 40-250 μ, de paredes transversais replicadas; cloroplasto solitário com 3-6 voltas; con-

jugação lateral e escalariforme; tubos de copulação formados por ambos os gametângios; células férteis muito intumescidas na região mediana. Zigósporos e aplanósporos elipsóides, com 23-32 × 40-70 μ; parede mediana do esporo amarela, lisa (Est. III, fig. 10).

BEIRA LITORAL: Cacia, margem da estrada nacional n.º 16, num charco temporário, relativamente abundante, 21-IV-1958, *Mesquita Rodrigues & A. Santos* B-589 h (COI).

Esta espécie, que é muito variável nas dimensões que apresenta, possui uma distribuição geográfica muito extensa, sendo conhecida na América do Norte, América do Sul, Europa, Ásia, África e Nova Zelândia. Em Portugal estava já citada para a Beira Baixa. [LACERDA, Publ. XXIII Congr. Luso-Esp., Coimbra 1956, V: 384 (1957)].

DESMIDIACEAE

Closterium moniliferum (Bory) Ehrenberg

Células de tamanho médio, com a margem dorsal muito curva e a margem ventral intumescida na região mediana, atenuadas para os ápices que são largamente arredondados; membrana lisa e incolor; pirenóides (4-8) em série axial.

Dimensões: comprimento 170-(230)450 μ; largura 28-(43)72 μ (Est. III, fig. 2).

BEIRA LITORAL: Avanca, margens do rio Gonde, nos charcos, raríssimo, 21-IV-1958, *Mesquita Rodrigues & A. Santos* A-590 b (COI).

Esta espécie foi herborizada por SAMPAIO [Bol. Soc. Brot. XVIII, 2.ª Sér.: 201 (1944)] em Matosinhos, Vila Nova de Gaia, Tabuaço e Coimbra, por GUERRERO (Agron. Lusit. XII: 66, 1950) e por nós [Publ. XXIII Congr. Luso-Esp., Coimbra 1956, V: 384 (1957)] no Gerês, sendo relativamente abundante tanto nas colheitas de SAMPAIO como nas nossas. Agora apenas observámos um exemplar.

Closterium Kützingii Brébisson

Células de tamanho médio, estreitas, quase rectas e fusiformes; pontas setáceas, hialinas, curvadas nas extremidades e sempre tanto ou mais longas que o resto do corpo da célula; ápices intumescidos, truncados ou redondos, providos de poros; membrana ordinàriamente incolor ou ligeiramente amarelada e com estrias finas às vezes pouco aparentes. Cloroplastos com 4-7 pirenóides dispostos em série linear.

Dimensões: comprimento 225-690 μ; largura 14-27 μ (Est. III, fig. 1).

BEIRA LITORAL: Cacia, margem da estrada nacional n.º 16, num charco, raro, 21-IV-1958, *Mesquita Rodrigues & A. Santos* A-589 a (COI).

C. Kützingii foi primeiramente assinalado em Portugal por SAMPAIO (*loc. cit.*: 228). Mais tarde, LACERDA (Bol. Soc. Port. Ciênc. Nat. XVI, 2.ª Sér.: 100, 1948) herborizou-o em Vendas Novas, Figueira da Foz e Angeja, tendo-o nós agora colhido próximo desta última localidade.

Pleurotaenium trabecula (Ehrenberg) Nägeli

Células grandes, cilíndricas, com as margens ligeiramente convexas, tendo na base 1-3 intumescimentos, atenuadas gradualmente do meio para as extremidades que são desprovidas de tubérculos. Cloroplastos parietais; vacúolos apicais, grandes, com numerosos corpúsculos móveis. Membrana incolor, lisa ou pontilhada.

Dimensões: comprimento 260-(470-510)660 μ; largura 24-(25-30)48 μ (Est. III, fig. 3).

BEIRA LITORAL: Avanca, margens do rio Gonde, nos charcos, comum, 21-IV-1958, *Mesquita Rodrigues & A. Santos* A-590 c, B-590 a, C-590 a (COI).

Esta espécie, cuja existência estava assinalada em Portugal para Póvoa de Lanhoso, Lisboa e Idanha-a-Nova [SAMPAIO, *loc. cit.*: 249; e LACERDA, Publ. XXIII Congr. Luso-Esp., Coimbra 1956, V: 382 (1957)], parece ser muito frequente na região de Avanca, pois que a encontrámos em diferentes colheitas efectuadas nesta última região.

Euastrum spinulosum Delponte var. **Henriquesii** Sampaio fil.

Células de tamanho médio, profundamente constrictas na parte média e com os sinus apertados, lineares e apenas abertos nas extremidades; hemi-células semi-circulares. Lobos laterais cónicos, alongados, de pontas levemente setosas e ápices arredondado-truncados. Ápices celulares côncavo-setosos, com a incisão média aberta em ângulo agudo. Membrana com espinhos localizados na região dos lobos, na área interior destes e sobre os bordos.

Dimensões das células: comprimento 72-80 μ; largura 68-72; istmo 12-15 μ; ápices 20-23 μ; espessura 35-37 μ (Est. III, fig. 5).

BEIRA LITORAL: Coimbra, Porto dos Bentos, margem direita do Mondego, num charco, abundante, 30-IX-1955, *A. Santos* 322 b (COI).

E. spinulosum está representado entre nós apenas pela var. *Henriquesii* descrita por SAMPAIO, em 1922 (*loc. cit.*: 296), sobre espécimes recolhidos em Bertiandos (Ponte de Lima), única localidade donde era conhecida. Dada a insuficiência das gravuras que conhecemos de *E. spinulosum* — deficiência aliás já apontada por aquele autor — tivemos muitas dúvidas quanto a saber se os nossos espécimes deveriam referir-se ao tipo ou à var. *Henriquesii*. A forma dos lobos laterais (especialmente dos lobos laterais superiores) e dos ápices celulares, assim como a localização dos espinhos levaram-nos, porém, a referir esses espécimes à variedade descrita pelo autor português.

Cosmarium reniforme (Ralfs) Archer

Células de tamanho médio, pouco mais compridas do que largas, com os sinus fechados externamente, mas abrindo-se largamente para o fundo, arredondando-se ou tornando-se frequentemente triangulares; semi-células reniformes, com secção lateral circular e secção transversal elíptica. Membrana granulosa, com grânulos dispostos em séries obliquamente cruzadas ou irregularmente verticais. Margem das semi-células com 25-30 grânulos. Cloroplastos axiais, com dois pirenóides.

Dimensões: comprimento 46-(57)59(60) μ; largura 44--(50-54)58 μ; largura do istmo 14-(16-18)18 μ (Est. III, fig. 4).

BEIRA LITORAL: Avanca, margens do rio Gonde, num charco, muito abundante, 20-IV-1958, *Mesquita Rodrigues & A. Santos* C-590 b (COI).

Esta espécie foi primeiramente herborizada em Portugal por SAMPAIO (*loc. cit.*: 374), que a colheu em Póvoa de Lanhoso e Valongo. Depois foi colhida por LACERDA em Angeja, na Figueira da Foz (Bol. Soc. Port. Ciên. Nat. XVI, 2.ª Série: 101, 1948) e em Idanha-a-Nova [Publ. XXIII Congr. Luso-Esp., Coimbra 1956, V: 383 (1957)], e por GUERRERO (*loc. cit.*: 70) na Serra do Gerês.

Cosmarium humile (Gay) Nordstedt var. **glabrum** Gutwinski

Células muito pequenas, ligeiramente mais compridas do que largas, profundamente constrictas, com sinus lineares um pouco dilatados no fundo; semi-células trapezoidais, mais largas na base que no ápice, com os lados tri-ondulados e o ápice largamente truncado, 2-4-ondulado; membrana com um grande grânulo no centro de cada semi-célula; secção lateral das semi--células circular ou quase, com uma protuberância central; secção transversal elíptica, também com um grânulo na parte média de cada lado; cloroplastos axiais com um pirenóide central.

Dimensões: comprimento 14,5-(14,5-15)18,4 μ; largura 13,4--(14-14,5)16 μ; largura do istmo 4,2-(4,3-4,4) 4,6 μ (Est. III, fig. 11).

BEIRA LITORAL: Avanca, margens do rio Gonde, num charco, raríssimo, 20-IV-1958, *Mesquita Rodrigues & A. Santos* C-590 c (COI).

C. humile estava representado em Portugal apenas pelo tipo, que foi herborizado por SAMPAIO (Bol. Soc. Brot. XVIII, 2.ª Sér.: 389, 1944) em Valongo, em Março de 1921. A var. *glabrum*, que é, pois, nova para o país e da qual foram observados sòmente dois exemplares, distingue-se do tipo por as semi-células possuirem apenas um grânulo central, não tendo grânulos mais pequenos dispostos irregularmente junto dos bordos das semi-células.

Cosmarium Botrytis Meneghini

Células grandes 1 1/4-1 1/3 vezes mais compridas do que largas, com uma constrição profunda na parte média e sinus lineares ligeiramente dilatados no fundo; semi-células ovado-piramidais ou alongadas com os ápices ligeiramente truncados, os ângulos da base arredondados e os lados convexos; membrana uniforme mas irregularmente granulosa, com 25-36 grânulos no contorno de cada semi-célula; secção lateral das semi-células elíptica, secção transversal também elíptica.

Dimensões: comprimento 65-90 μ; largura 51-68 μ; largura do istmo 17-24 μ.

BEIRA LITORAL: Avanca, margens do rio Gonde, nos charcos, frequente, 20-IV-1958, *Mesquita Rodrigues & A. Santos* A-590 d, B-590 b, C-590 d (COI).

Esta espécie, que foi herborizada em várias localidades do país por SAMPAIO (*loc. cit.*: 395), ALTE (Publ. Inst. Bot. Dr. G. Samp. 2.ª Sér., 27: 8, 1954) e LACERDA (*loc. cit.*: 382), era frequente nas águas dos charcos das margens do rio Gonde, em Avanca, tendo sido encontrada, embora nunca com grande abundância, em diferentes colheitas ali efectuadas.

Cosmarium quadrum Lundell var. **sublatum** (Nordstedt) West & West

Células de tamanho médio, de contorno geral quadrangular, tão compridas como largas ou apenas um pouco mais compridas, sinus lineares, ligeiramente dilatados na extremidade; semi-células subrectangulares, com os ângulos basais e superiores arredondados e os lados ligeiramente convexos; ápice levemente retuso (por vezes direito). Semi-células subcirculares em secção longitudinal, e oblongo-elípticas em secção transversal. Membrana densamente granulosa; grânulos dispostos em séries oblíquas entrecruzadas e em séries verticais, por vezes menos distintas, com 34-37 grânulos na margem de cada semi-célula e muitas vezes de tamanho mais reduzido no meio dos ápices. Cloroplastos axiais, com dois pirenóides em cada semi-célula. Zigósporo desconhecido.

Dimensões: comprimento 65-(72)83 μ; largura 54-(70)74 μ; largura do istmo 18-(18)29 μ; espessura 27-(27)40 μ (Est. III, fig. 6-8).

BEIRA LITORAL: Coimbra, Porto dos Bentos, margem direita do Mondego, num charco, muito raro, 30-IX-1955, *A. Santos* 322b (COI).

C. quadrum é uma espécie relativamente rara mas cuja existência tem sido assinalada nos Estados Unidos, na Ásia, na África Central e na Europa (Grã-Bretanha, França, Alemanha, Áustria, Escandinávia, Polónia, Finlândia e N. da Rússia).

Os espécimes que devem referir-se à var. *sublatum* foram descritos por NORDSTEDT sobre material da Austrália.

A espécie não se encontrava representada em Portugal, sendo a var. *sublatum* distinta do tipo pela existência de pequenas pontuações situadas entre os grânulos que ornamentam a membrana, os quais são ocos.

Observámos apenas dois exemplares, infelizmente imaturos.

Staurastrum hirsutum (Ehrenberg) Brébisson

Células pequenas, 1 1/4 vezes mais compridas do que largas, profundamente constrictas na parte média, com sinus em ângulo agudo pouco aberto; semi-células subtrapezoidais, sub-reniformes ou subsemicirculares, alargando junto da base e com os ângulos largamente arredondados; membrana delicadamente espinhosa, com os espinhos dispostos em séries concêntricas à volta dos ângulos. Secção vertical triangular, com os lados quase rectos, os ângulos obtuso-arredondados e o centro do ápice liso. Cloroplastos axiais, com um pirenóide central em cada semi-célula.

Dimensões: comprimento (sem espinhos) 34-(44)44 μ; largura (sem espinhos) 31-35(37) μ; largura do istmo 10-(13)13 μ; comprimento dos espinhos 1,5-2 μ (Est. III, fig. 12).

BEIRA LITORAL: Avanca, margens do rio Gonde, num charco, raro, 20-IV-1958, *Mesquita Rodrigues & A. Santos* C-590e (COI).

S. hirsutum é uma espécie com larga distribuição geográfica, tendo sido herborizado em quase todos os países da Europa, desde a Finlândia e da Roménia para Ocidente, nas Faroë, no Spitzberg, na Groenlândia, nos Estados Unidos, na Colômbia, no Brasil e no Paraguai.

Em Portugal tinha sido colhido por W. West em Leça da Palmeira (Sampaio, *loc. cit.*: 451) e por Guerrero (Agron. Lusit. XII: 73, 1950) na Serra do Gerês.

CHLOROCOCCACEAE

Golenkinia radiata (Chodat) Wille

Células esféricas, livres, flutuantes, com setas compridas e muito finas; células normalmente solitárias mas formando por vezes falsas colónias com 4 indivíduos em consequência do entrelaçamento das setas. Cloroplasto parietal em forma de taça, com um pirenóide.

Dimensões: diâmetro das células 7-15 μ; comprimento das setas 24-45 μ (Est. IV, fig. 1).

BEIRA LITORAL: Coimbra, Jardim Botânico, num tanque, comum, 26-IX-1955, *Mesquita Rodrigues* 316 a (COI).

HYDRODICTYACEAE

Pediastrum Boryanum (Turpin) Meneghini

Cenóbios circulares ou ovóides com 4-8-16-32-64-128-256 células (em geral 8-16-32), normalmente dispostas em séries concêntricas e não deixando espaços entre elas. Células com 4-6 lados e com as paredes granulosas; células periféricas possuindo nas margens externas dois processos truncados e incolores na parte terminal.

Dimensões: diâmetro das células 15-30 μ. Colónia de 32 células com 80-100 μ de diâmetro (Est. IV, fig. 2, 3).

BEIRA LITORAL: Coimbra, Porto dos Bentos, margem direita do Mondego, num charco, relativamente abundante, 30-IX-1955, *A. Santos* 322 c (COI).

Espécie largamente distribuída e muito comum no plâncton dos lagos e charcos.

Pediastrum duplex Meyen

Cenóbios com 8-16-32-64-128 células, com pequenos espaços lenticulares entre as internas, que têm um contorno mais ou menos rectangular, com a margem externa côncava. Células periféricas possuindo na face externa dois prolongamentos truncados, afastados por uma distância aproximadamente igual a metade da que separa os prolongamentos de duas células adjacentes. Células com cerca de 16 μ de diâmetro. Colónia de 32 células com 100 μ de diâmetro; colónia de 64 células, elíptica, com 165 × 240 μ de diâmetro (Est. IV, fig. 4, 5).

BEIRA LITORAL: Coimbra, Porto dos Bentos, margem direita do Mondego, num charco, rara, 30-IX-1955, *A. Santos* 322 d (COI).

P. duplex é uma forma comum do plâncton, que pela primeira vez se assinala em Portugal.

OOCYSTACEAE

Dictyosphaerium pulchellum Wood

Colónias com 32 células esféricas ou ovóides, dispostas em séries de 4, sobre filamentos ramificados dicotòmicamente, envolvidos por mucilagem.

Dimensões: diâmetro das células 3-10 μ (Est. V, fig. 1).

BEIRA LITORAL: Coimbra, Jardim Botânico, num tanque, relativamente rara, 26-IX-1955, *Mesquita Rodrigues* 316 b (COI).

Esta espécie é frequentemente encontrada no plâncton dos lagos e charcos de águas ácidas, tendo uma larguíssima distribuição geográfica.

Kirchneriella lunaris (Kirchner) Moebius

Colónia composta de numerosas células, dispostas em grupos de 4-16, encerradas num invólucro gelatinoso. Células em forma de crescente, muito curvadas, com extremidades obtusas. Cromatóforo subinteiro, com um pirenóide aplicado à

parede convexa das células. Colónias podendo atingir 250 μ de comprimento (Est. V, fig. 2).

BEIRA LITORAL: Coimbra, Jardim Botânico, num tanque, rara, 26-IX-1955, *Mesquita Rodrigues* 316 c (COI).

Tetraedron minimum (A. Braun) Hansgirg.

Células pequenas, achatadas, tetragonais, com os ângulos arredondados e os lados côncavos. Vista lateral fusiforme-elíptica. Parede lisa ou finamente granulosa. Cloroplasto simples, parietal, com um pirenóide. Células com 6-20 μ de comprimento e 5-8 μ de espessura (Est. V, fig. 3).

BEIRA LITORAL: Coimbra, Jardim Botânico, num tanque, rara, 26-IV-1955, *Mesquita Rodrigues* 316 d (COI).

SCENEDESMACEAE

Scenedesmus brasiliensis Bohlin

Colónia formada por 2-4-8 (geralmente 4) células subcilíndricas ou ovado-elipsóides, dispostas numa única série linear. Ápices das células com 1-4 pequenos dentes e com uma linha longitudinal mediana estendendo-se entre os ápices de cada célula. Células com 3-6 μ de largura e 11-25 μ de comprimento. Cenóbios de 4 células com 12-25 μ de comprimento (Est. V, fig. 4, 5).

BEIRA LITORAL: Coimbra, Porto dos Bentos, margem direita do Mondego, num charco, relativamente abundante, 30-IX-1955, *A. Santos* 322 e (COI).

Scenedesmus longus Meyen var. **Naegelii** (Brébisson) G. M. Smith

Colónia constituída por 8 células cilíndricas dispostas numa única série linear. Células externas com uma longa espinha curva em cada pólo; células internas apenas com uma longa espinha curva em um dos pólos (raramente com uma espinha em cada pólo ou sem espinhas em qualquer dos pólos).

Células com (9)6-(10)11 μ de largura e 18(23)-(27)33 μ de comprimento.

Colónias de 8 células com 50(68)-(71)85 μ de comprimento (Est. V, fig. 6-8).

BEIRA LITORAL: Coimbra, Jardim Botânico, num tanque, abundante, 26-IX-1955, *Mesquita Rodrigues* 316 e (COI).

Esta alga foi descrita por Brébisson em 1856 (Mem. Soc. Imp. Sc. Nat. de Cherbourg, IV: 158), sobre desenhos de *S. quadricauda* Corda publicados por Nägeli em 1849 (Gatt. Einz. Algen: 91, Est. 5, figs. 2 c,-2 d).

Smith (1916), na sua «Monograph of *Scenedesmus*», inclui-a como sinónimo de *S. longus* Meyen.

Em 1920 (Wisconsin Geol. Nat. Hist. Surv.: 57, 156), porém, o mesmo autor reconheceu-a como uma variedade distinta de *Scenedesmus longus* [que denominou *Scenedesmus longus* Meyen var. *Naegelii* (Brébisson) G. M. Smith], notando — embora Meyer não dê nenhuma indicação sobre a ampliação dos seus desenhos — que as células da variedade são bastante maiores (6,6-11 × 18-33 μ) que no tipo (4-5 × 8-11 μ) e que a disposição peculiar das espinhas que se observa nas células interiores, figurada por Nägeli (*loc. cit.*), é um carácter frequente mas não constante. Efectivamente, os desenhos de Nägeli mostram a existência em 3 células internas adjacentes de uma espinha longa em um dos pólos, não possuindo nenhuma espinha no outro, dando-se a condição inversa nas restantes 3 células internas. Smith (1916, 1920), porém, nota que as espinhas podem ocorrer ou não em ambos os pólos de qualquer célula da colónia. Entretanto, Chodat (1920) identifica *S. Naegelii* Brébisson (= *S. caudatus* var. *horridus* Wolle) com *S. setiferus* Chodat, propondo, para os espécimes colhidos, figurados e descritos por Smith (1916, *loc. cit.*) um nome novo: *S. Smithii* Chodat, pois que tais exemplares são «certamente novos e merecem um nome específico».

Porém, os autores modernos [p. ex. Teiling (Bot. Not.: 77, 1946) e Prescott (Algae W. Great. Lak. Area: 278, 1952)] ou consideram *S. Naegelii* Brébisson como uma boa espécie, na qual reconhecem mesmo certas variedades, ou, como faz Smith (1916, 1920), referem os espécimes com os quais se identifica

a uma variedade de *Scenedesmus longus* Meyen, a var. *Naegelii* (Brébisson) G. M. Smith.

Não tendo tido oportunidade de fazer o estudo de material em culturas puras, que nos parece indispensável, seguimos contudo a opinião de Smith e outros. Desde já, porém, parece evidente que a descrição da variedade, tal como é feita por Smith (1920) e Prescott *(loc. cit.)*, deve ser modificada no sentido de incluir os espécimes com cenóbios 4-celulares. Efectivamente, numa colheita realizada num tanque do Jardim Botânico de Coimbra foram encontrados numerosos exemplares desta alga, que é nova para a flora portuguesa, os quais se harmonizam perfeitamente com as descrições e gravuras que conhecemos dos cenóbios de 8 células de *S. longus* var. *Naegelii*, embora se não tivessem encontrado exemplares em que as células interiores fossem providas de uma longa espinha recurvada em ambos os pólos das células interiores, como os observados por Smith *(loc. cit.)* em material dos Estados Unidos. Encontrámos constantemente nas referidas células uma espinha longa num dos pólos e sòmente um pequeno dente no outro, assemelhando-se por isso mais, a este respeito, os nossos espécimes com os desenhados por Nägeli do que com os figurados por Smith. Mas a par destas colónias com 8 células foram observadas outras, também com bastante frequência, que, sendo idênticas àquelas pela forma, disposição e dimensões das células e forma e dimensões dos espinhos, possuiam apenas 4 células e nos quais, tal como acontece com certos espécimes 8-celulares, as células interiores eram desprovidas de qualquer ornamentação no pólo oposto àquele em que se situam os espinhos.

Parece, pois, e ao menos até que haja possibilidade de estudar estas diferentes linhas em cultura pura, que a diagnose original de *S. longus* Meyen var. *Naegelli* (Brébisson) G. M. Smith deve emendar-se no sentido de incluir os espécimes que possuam cenóbios 4-celulares, do seguinte modo:

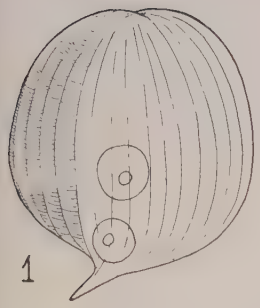
Coenobia 4-8 cellularum .....

Dimens. cell.: 6,6-11 × 18-33 μ.
Dimens. col. 4-cell.: 18-33 × 35-42 μ.
Dimens. col. 8-cell.: 18-33 × 50-85 μ.

ESTAMPAS

Estampa I

Fig. 1 — *Phacus orbicularis* Hübner. × 600.
Fig. 2 — *Trachelomonas volvocina* Ehrenberg. × 1000.
Fig. 3 — *Cystodinium Steinii* Klebs. × 700.
Fig. 4 — *Vaucheria sessilis* (Vaucher) De Candolle. Pormenor dos órgãos reprodutores. × 600.
Fig. 5 — *Vaucheria sessilis* (Vaucher) De Candolle. × 150.
Fig. 6 — *Eudorina elegans* Ehrenberg. × 600.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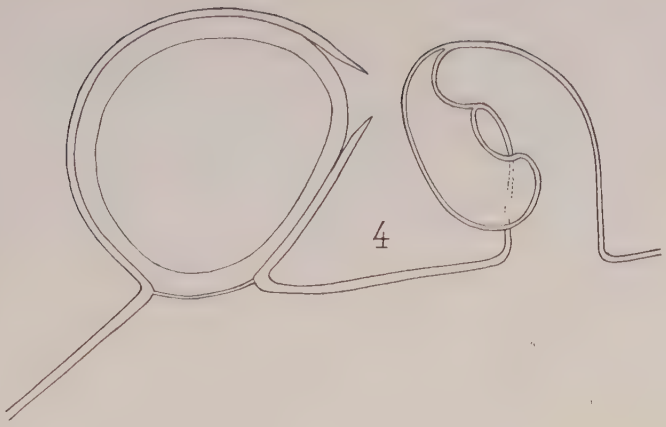
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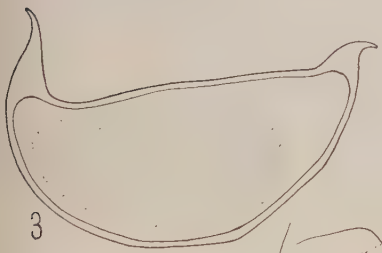
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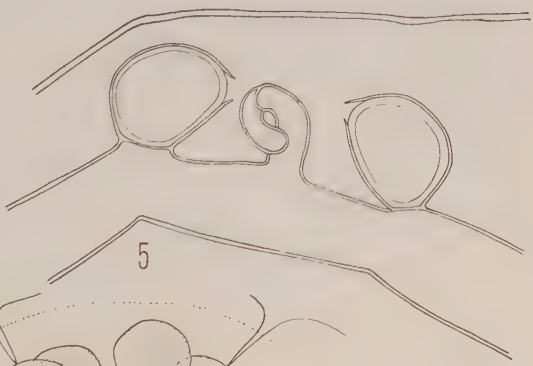
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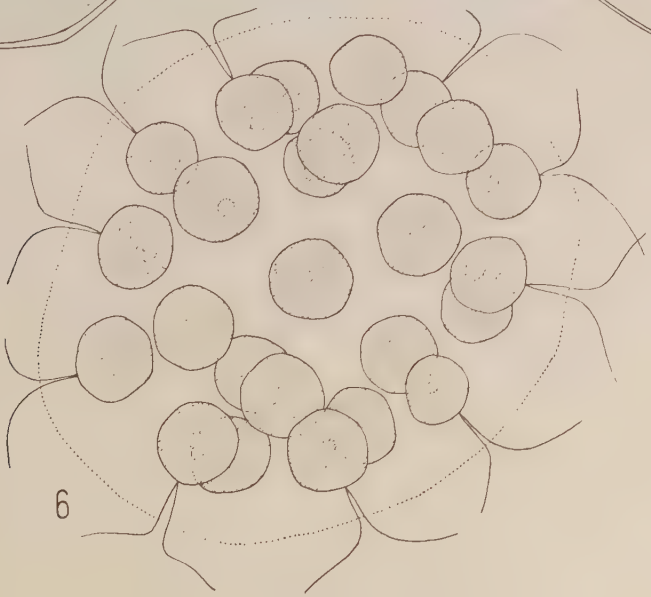
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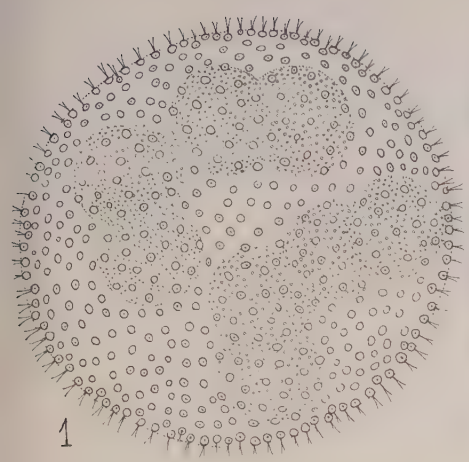
Fig. 6 — *Microspora Loefgrenii* (Nordstedt) Lagerheim. × 600.
Fig. 7 — *Microspora Loefgrenii* (Nordstedt) Lagerheim. × 600.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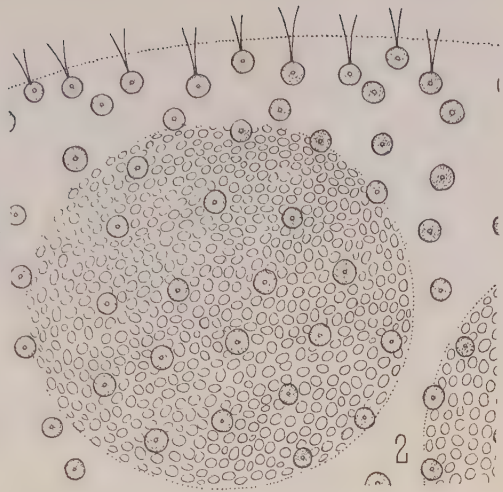
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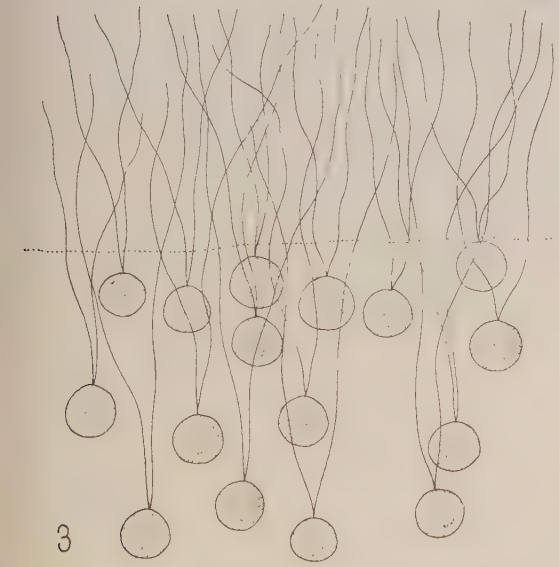
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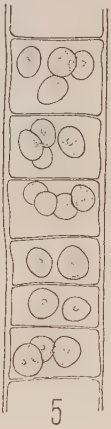
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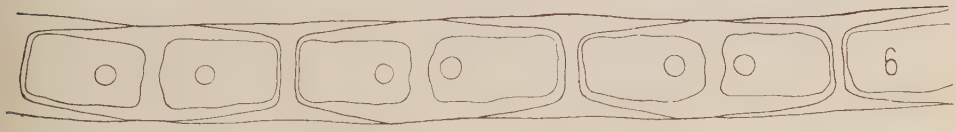
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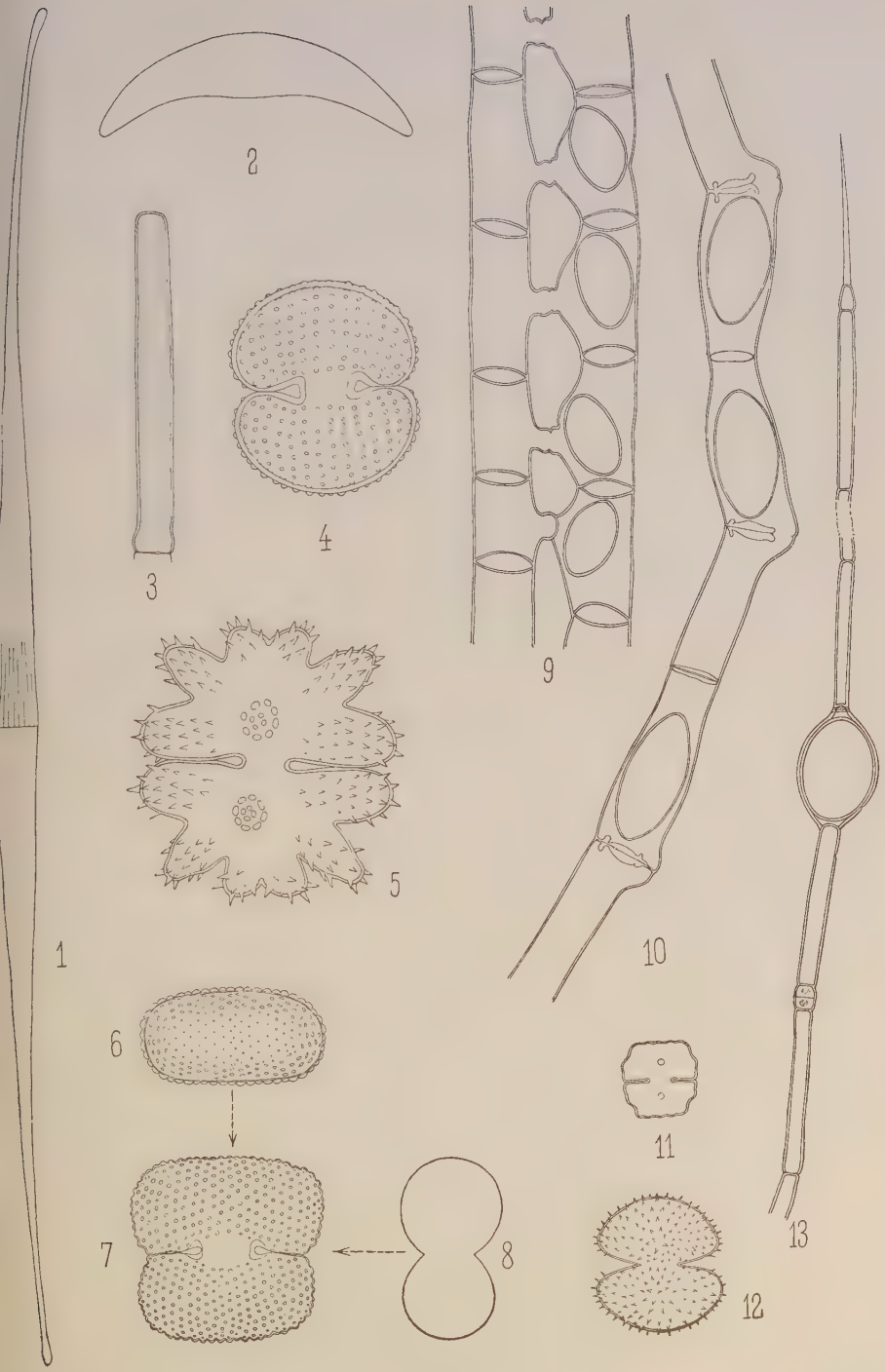
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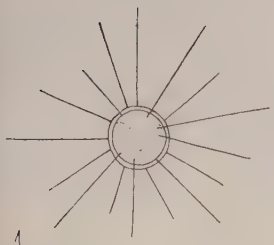

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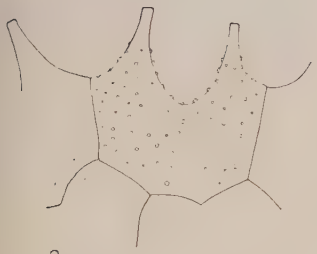

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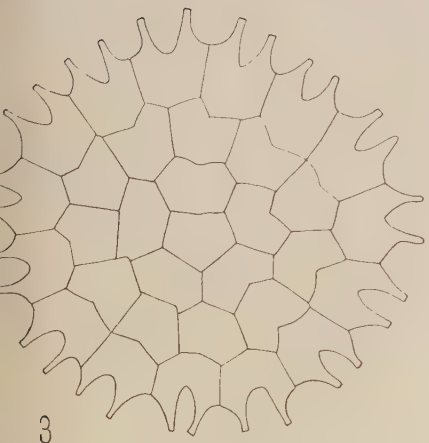

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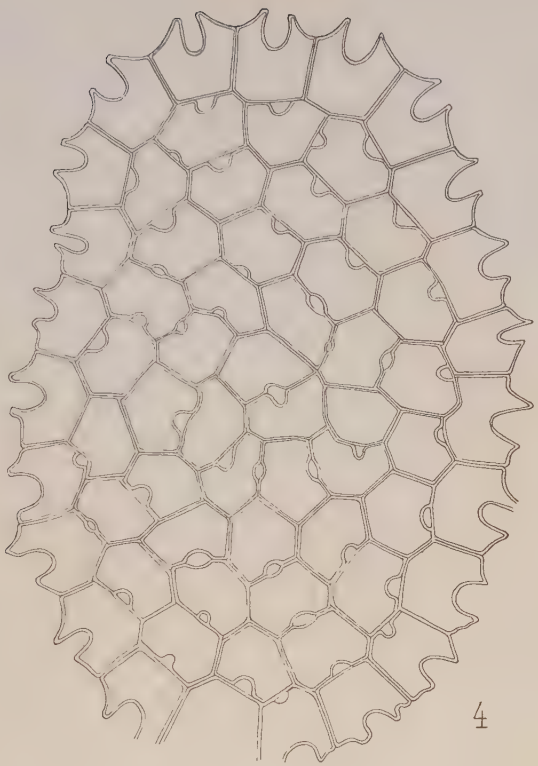

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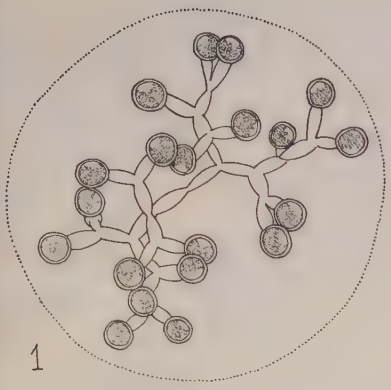

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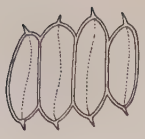

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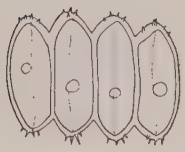

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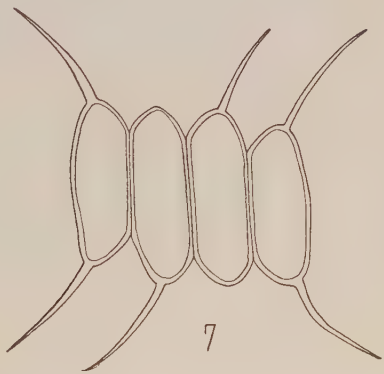

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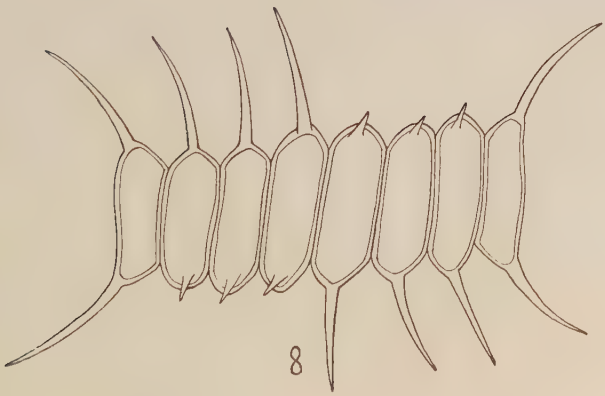

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